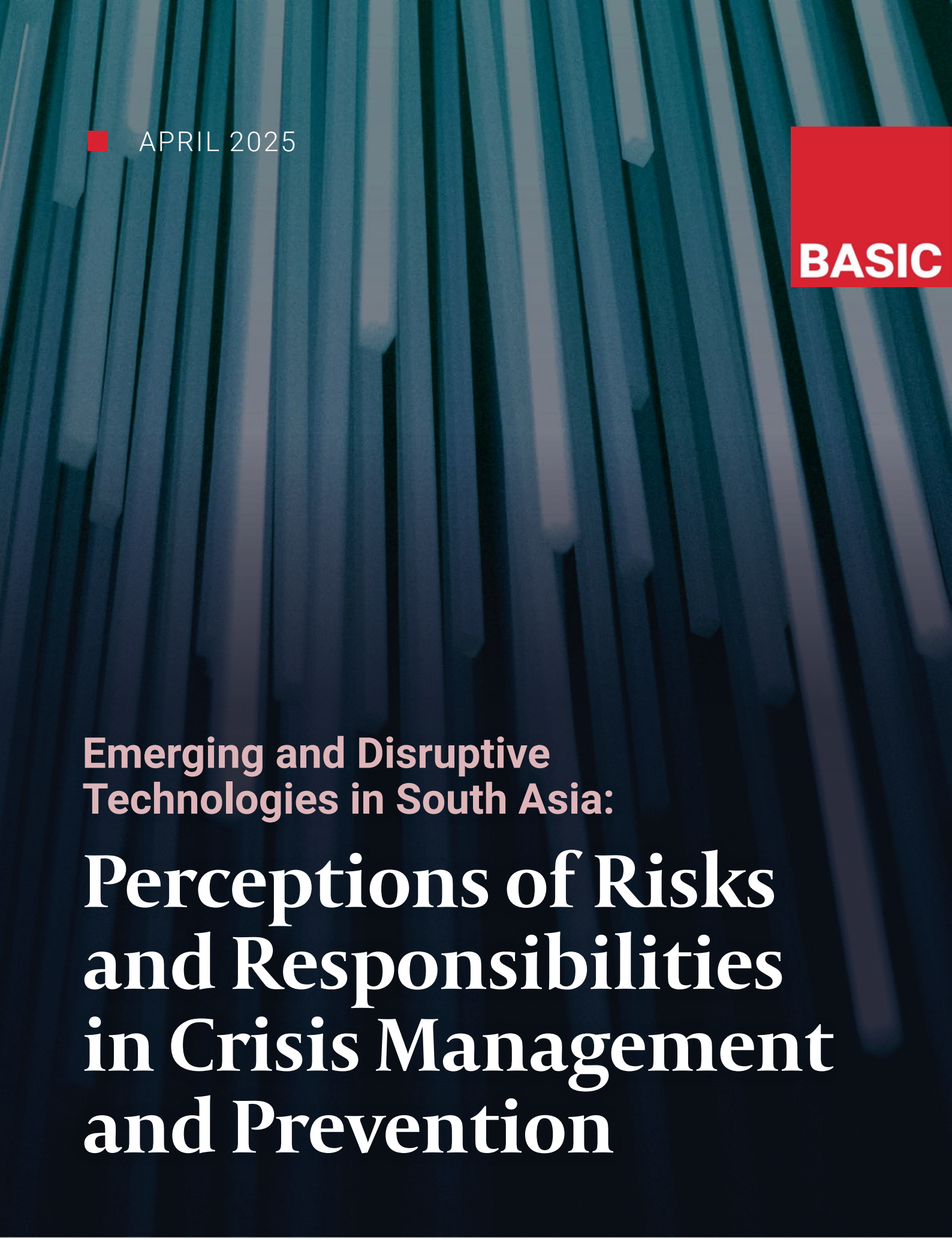

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BASIC

Emerging and Disruptive Technologies in South Asia:

Perceptions of Risks and Responsibilities in Crisis Management and Prevention

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About BASIC

BASIC is an independent, non-profit think tank working to safeguard humanity and Earth's ecosystem from nuclear risks and interconnected security threats, for generations to come.

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Executive Summary

This report is the product of a STREAM survey and two dialogues with members of the Indian and Pakistani nuclear policy communities at the track 2/1.5 level, conducted by BASIC between 2024 and 2025.

The report explores the impact of "near-term" EDTs (defined as those that are currently in development or expected to develop over the next 5-10 years in South Asia) on India and Pakistan's capacities to manage and prevent crises. The key argument of this report is that technological asymmetries in the India-Pakistan nuclear dyad–exacerbated by strategic partnerships and the technology transfers they enable–will significantly shape how EDTs influence crisis behaviour. In particular, each side tends to assume the worst about the other's technological advancements and struggles to recognise how its own weapon development might be perceived as threatening–especially in a context where between offensive and defensive capabilities are difficult to distinguish. Strengthening crisis prevention and management mechanisms in the India-Pakistan dyad amid technological developments requires careful consideration and proactive measures, including reassurance mechanisms and responsible practices outlined in this report.

The report is divided into three parts:

- **Part A** explores the findings of a STREAM survey that BASIC conducted with Indian, Pakistani, and international experts exploring the impact of EDTs on India and Pakistan's crisis management and prevention capacities. Key findings include (i) a 'Maturity-Perception Effect', in which overall, the more mature a technology is, the more disruptive its effect is perceived with regard to crisis prevention and management; and (ii) a potential bias in which nationals of the country which possess and is developing the EDT perceive its impact more positively than participants from the country that is technologically less advanced.

- **Part B** focuses on the findings of a BASIC in-person track 2/1.5 dialogue with Indian and Pakistani participants held in Manama in November 2024. This dialogue tested the survey findings qualitatively by mapping perceptions of the risks EDTs pose to crisis management and prevention, and exploring whether these risks are shared by India and Pakistan, potentially creating new opportunities for cooperation. The technologies discussed included AI for information warfare, AI for cyber operations, quantum technologies, BMDs, and MIRVs. Participants engaged the core question of how far EDTs can be expected to undermine the "culture of restraint" (a term used by one of the participants at the dialogue) that has historically helped manage India-Pakistan crises.

- **Part C** presents policy proposals and responsible practices developed from a BASIC in-person track 2/1.5 dialogue with Indian and Pakistani participants held in Istanbul in February 2025. Co-authored by Rabia Akhtar, Ruhee Neog, Hina Pandey, and Adil Sultan, this section adopts solution-oriented and pragmatic approaches, aiming to mitigate the risks that EDTs pose to crisis stability by reducing anxieties around preemption and establishing a framework of cooperation to prevent future crises. It begins by examining what can be achieved at the international level, a key focus of the Istanbul discussions. In exploring creative—perhaps even "out-of-the-box"—ideas involving the UNSC, NAM, and SCO, the authors acknowledge that meaningful and sustained progress will ultimately hinge on the ability of the N5 to establish a common consensus on regulating EDTs. However, given the deep distrust between Western and non-Western members of the N5, they find it unlikely that the group will take a leadership role in this area. Recognising the limitations of international efforts, Akhtar et al. explore alternative pathways, including the possibility of India and Pakistan developing a bilateral security framework to address the shared risks posed by EDTs.

Box 1:

Proposals at the International Level:

- Governance Mechanisms for Emerging Technologies (Pact for the Future, UNSCR 1540 Model).
- Expand nuclear risk reduction dialogues to incorporate EDT-related concerns.
- Leverage multilateral platforms such as NAM, SCO, and TPNW to foster responsible state and non-state behavior concerning EDTs.

Proposals at the Bilateral Level (India-Pakistan):

- Unilateral commitments by India and Pakistan to ensure human control over decision-making in AI-enabled warfare.
- Cyberwarfare CBM: Extend the 1988 India-Pakistan agreement to include commitments against using cyber weapons to degrade retaliatory nuclear capabilities, especially NC3 systems.
- Prohibit the deployment of fully autonomous weapons in South Asia, though there would be challenges related to sovereignty—and legal and ethical issues would need to be addressed.
- Hotlines and Crisis Communication Mechanisms: Improve crisis communications between India and Pakistan by integrating EDT discussions into existing hotlines or creating new mechanisms specifically for AI and cyber risks.
- Use the DGMO hotline to address EDT-related anxieties, especially concerning AI in nuclear decision-making.

Initiatives at the Track 2/1.5 Level:

- Track 2/1.5 India-Pakistan Joint Working Group on EDTs: Establish a working group, consisting of technical experts and policy-makers from India and Pakistan, focused solely on EDTs.
- Bilateral track 2 Engagement through Think Tank Exchanges: Foster sustained, informal dialogues between Indian and Pakistani think tanks, involving direct partnerships and collaborative research projects.

Introduction

Chiara Cervasio and Nicholas J. Wheeler

Writing in *The Control of the Arms Race* (1961), the Australian International Relations (IR) theorist Hedley Bull identified what he called 'the problem of "continuous technological innovation" in the context of attempts by adversary states to regulate and constrain new weapons technology.[1]

The principal mechanism Bull was interested in to reduce the risks of nuclear conflict between the Cold War nuclear adversaries was the then nascent concept of arms control.[2] The concerns shared by Bull and his fellow strategists on both sides of the Atlantic about the impact of the disruptive technologies of their time–ballistic missiles launched from land and sea and anti-ballistic missile defence systems–finds a strong echo in contemporary debates about the impact of "Emerging and Disruptive Technologies" (EDTs) on strategic stability[3] in today's multipolar nuclear world.

Our focus in this report is on the impact of EDTs on strategic stability between India and Pakistan. Specifically, the report explores the impact of "near-term" EDTs–defined as those that are currently in development or can be expected to develop over the next 5-10 years in South Asia–on India and Pakistan's capacities to manage and prevent crises. However, the report proceeds from the crucial premise that the bilateral strategic relationship between the two South Asian nuclear adversaries cannot be separated from what Rabia Akhtar calls the "Nuclear Tetraplex". Akhtar uses this term to capture the complex dynamics of a four-way set of relationships involving India and Pakistan and the United States and China.[4]

In April 2024, BASIC published a report entitled *Crisis Prevention and Management in South Asia: Mutual Confidence, Risk, and Responsibility* that identified key sources of restraint and stability in the India-Pakistan nuclear relationship. We argued that: "there is mutual confidence that the other can be relied upon to show restraint in times of crisis and not push their adversary into a choice between a humiliating defeat and escalating the crisis to the nuclear level".[5] Nevertheless, we also concluded that these sources of restraint were fragile ones, and that there was a risk that "(over)confidence may slip into complacency".[6] The report identified five responsibility-based policy recommendations aimed at maintaining and strengthening these sources of restraint.[7]

1 Hedley Bull, *The Control of the Arms Race: Disarmament and Arms Control in the Missile Age* (London: Weidenfield & Nicolson, 1961).

2 Developed in the United States by Thomas Schelling and Morton Halperin in *Strategy and Arms Control* (New York: Twentieth Century Fund, 1961), and in the United Kingdom by Bull in *The Control of the Arms Race* (see also Donald G. Brennan (ed.), *Arms Control, Disarmament, and National Security* (New York: George Braziller, 1961), arms control is predicated on the idea that adversaries can share a common interest in restraint. Schelling and Halperin explain that: "The essential feature of arms control is the recognition of the common interest, of the possibility of the reciprocation and cooperation even between potential enemies with respect to their military establishments" (Schelling, and Halperin, *Strategy and Arms Control*, p.2).

3 The concept of strategic stability has a number of different usages (for an excellent overview, see James M. Acton, 'Reclaiming Strategic Stability', *Strategic Studies Institute*, 5 February 2013, https://carnegieendowment.org/posts/2013/02/reclaiming-strategic-stability?lang=en) but most definitions coalesce around this core proposition: a condition where nuclear-armed adversaries have no incentive to launch a pre-emptive nuclear strike-either because they believe that this will secure them a meaningful military advantage or out of fear that their adversary is about to attack them. Strategic stability between nuclear-armed states depends on a condition where each believes they have an assured destruction capability against the other, even after the other has launched a first strike.

4 Rabia Akthar, 'The Inevitability of the Emerging Nuclear Tetraplex', *Pakistan Politico*, 17 October 2023, https://pakistanpolitico.com/tetraplex/.

5 Chiara Cervasio, Nicholas J. Wheeler, and Mhairi McClafferty, *Crisis Prevention and Management in South Asia: Mutual Confidence, RIsk, and Responsibility* (BASIC, 2024), p.8, https://basicint.org/report-crisis-prevention-and-management-in-south-asia/.

6 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*, p.6.

7 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*, pp.23-28.

> ***To pursue this investigation, we adopted both a quantitative and qualitative methodological approach.***

Some of these recommendations anticipated the advent of EDTs and considered how they might be managed to promote crisis stability. It is this subject that we examine in depth in this report. To what extent do EDTs—keeping in mind that what is considered emerging in one regional nuclear context may already be mature and established in another[8]—pose a critical challenge to the mutual confidence that has developed between the two sides that each can rely on the other's restraint in times of crisis.

To pursue this investigation, we adopted both a quantitative and qualitative methodological approach. The first stage was the quantitative one, detailed in Part A of the report written by Eva-Nour Repussard. We ran a survey of Indian, Pakistani, and international expert views on the impact of EDTs on India and Pakistan's crisis management capacities–as well as the likelihood that EDTs would increase the risk of future crises. Two key findings emerged from the survey: first, what Repussard calls the "maturity perception effect"–the more mature a technology is perceived to be, the more it is perceived as having a disruptive impact on crisis management and prevention. This finding was particularly strong in the Indian and Pakistani participants surveyed.

The second finding is a cognitive one: perceptions of EDTs on the part of Indian and Pakistani respondents reflected the operation of a psychological bias that is familiar to theorists of the security dilemma in IR. The survey reveals implicit evidence of what has been called the problem of "peaceful/defensive self-images".[9] This is the difficulty adversaries have of recognising how the weapon systems they acquire might be seen as threatening by others because they believe that their adversary knows they do not harbour malign intent.[10] This was vividly illustrated in 1983 when US Defence Secretary Caspar Weinberger commented on the Soviet Union's fears regarding what was, at the time, the EDT of its day—the US Strategic Defence Initiative (SDI), President Reagan's plan to create a space-based defence of the United States from nuclear attack. In response to Soviet claims that SDI was aimed at providing the United States with a first strike capability, Weinberger replied that the Soviet Union had "no need to worry" about SDI because "they know perfectly well that we will never launch a first strike on the Soviet Union".[11] The survey suggested that this cognitive bias was at play: Indian participants assessed the impact of technologies where India is clearly ahead–such as ballistic missile defence and hypersonic weapons–less negatively on crisis management and prevention than did Pakistani respondents.

Following on from the survey, we organised an in-person track 2/1.5 dialogue between Indian and Pakistani participants (held in Manama, Bahrain in November 2024) to test the quantitative findings qualitatively.

8 Rabia Akhtar, and Manpreet Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', *The Washington Quarterly* 47(4) (2024): 99-116, https://doi.org/10.1080/0163660X.2024.2435161.

9 Ken Booth, and Nicholas J. Wheeler, *The Security Dilemma: Fear, Cooperation and Trust in World Politics* (Basingstoke: Palgrave Macmillan, 2008), pp.51-58. The actual term was coined by Nicholas J. Wheeler in "To Put Oneself into the other Fellow's Place": John Herz, the Security Dilemma and the Nuclear Age, *International Relations* 22(4) (2009): 493-509, especially p.495 https://doi.org/10.1177/0047117808097731.

10 The classic statement of this position is Herbert Butterfield, *History and Human Relations* (London: Collins, 1951). See also Robert Jervis, *Perceptions and Misperceptions in International Politics* (Princeton: Princeton University Press, 1976), and Robert Jervis, 'Cooperation under the Security Dilemma', *World Politics* 30(2) (1978): 167-214, https://doi.org/10.2307/2009958.

11 Quoted in Charles L. Glaser, *Analyzing Strategic Nuclear Policy*, Vol. 1188 (Princeton, NJ: Princeton University Press, 1990, p.77.

The dialogue - grounded in BASIC's well-tried and tested method and process[12]—explored the extent to which Indian and Pakistani participants shared assessments of the risks EDTs posed to crisis management and prevention between India and Pakistan. The findings from the Manama dialogue are detailed in Part B of the report written by Mhari McClafferty.

The deliberations at the Manama dialogue reinforce the survey findings that EDTs are invariably viewed through the prism of "peaceful/defensive self-images".[13] Dialogue participants frequently fell into the trap of assuming that what they saw as their state's defensive technological developments would be understood by the adversary in the same way. A good example of this emerged during an exchange in which one participant argued that their side's development of quantum computing–intended to protect against cyber attacks–did not pose a threat to the adversary, as the technology would be used solely for defensive purposes. Not surprisingly, the participant from the adversarial state was not reassured by this claim, pointing out that incorporating quantum technology into cyber systems would significantly enhance a state's capacity to launch a cyber attack.

This exchange highlighted two broader points from the dialogue that McClafferty explores at length in Part B. The first is that Indian and Pakistani decisionmakers, officials, and policy influencers who hold peaceful/defensive self-images will struggle to understand why an adversary feels threatened by the development of new weapons technologies. The reasoning is that technologies such as AI and cyber are safe in *our* hands because we do not pose a threat to others. But the belief that "they have nothing to fear from us"[14] is usually accompanied by the belief that "we have to fear them"[15]–and any new technologies they might develop. Part B identifies how these cognitive biases play a central role in shaping perceptions of EDTs in South Asia, with both India and Pakistan viewing their own actions as stabilising and defensive while perceiving the other's actions as offensive. These cognitive dynamics lead Indian and Pakistani decisionmakers to consistently view each other as inherently hostile, untrustworthy, and motivated by aggressive intent. As McClafferty points out, such distrust-driving dynamics–evident in some of the deliberations at the dialogue–significantly heighten the risk of misperceptions and misunderstandings in times of crisis, as both sides fall back on these pernicious cognitive heuristics.

The second challenge that was evident in the deliberations at Manama is the problem of offence-defence differentiation. Even if decision-makers can escape the problem of cognitive biases and remain open to the possibility that the other is acting out of fear and insecurity, the fundamental problem is how they can signal their peaceful intentions to an adversary when the means of defence can all too easily become the weapons of offence. As Charles Glaser expressed it: two adversaries interacting in the context of the offence–defence differentiation problem face "a security dilemma […] when the actions it would take to increase its adversary's security would increase its own vulnerability to attack and, therefore, might decrease its own security".[16]

The problem of offence-defence differentiation poses a major challenge for efforts at reassurance between two adversaries. This difficulty is aggravated if both sides–as in the India-Pakistan case–are operating with what Ole Holsti calls an "'inherent bad faith" model of one's adversary.[17] Any attempt by one side to signal its defensive intent–where offence-defence differentiation is not possible–and where decision-makers in the receiving state are operating with a "bad faith model" is likely to be dismissed by that state as a trick or a sign of weakness.

12 Sebastian Brixey Williams, Alice Spilman, and Nicholas J. Wheeler, The Nuclear Responsibilities Toolkit: A Practical Guide for Thinking, Talking and Writing (BASIC-ICCS, 2021), https://basicint.org/the-nuclear-responsibilities-toolkit-a-practical-guide-for-thinking-talking-and-writing/.

13 As Repussard highlights in Part A, "the data seems to show that for participants, EDTs rarely have an inherent positive or negative impact on crisis prevention and management, rather their impact is perceived in relation to whether a country has developed said technology, and whether the adversarial state possesses it as well" (p.16).

14 We are borrowing this formulation from Booth, and Wheeler, *The Security Dilemma* (see pp.51-58).

15 We are borrowing this formulation from Booth, and Wheeler, *The Security Dilemma* (see pp.65-70).

16 Charles L. Glaser, *Rational Theory of International Politics: The Logic of Competition and Cooperation* (Princeton, NJ: Princeton University Press, 2010), p.8.

17 Ole R Holsti, 'Cognitive Dynamics and Images of the Enemy: Dulles and Russia' in David J. Finlay, Ole R. Holsti, and Richard R. Fagen, *Enemies in Politics* (Chicago, Rand McNally, 1967), p.26.

> ***The challenge for India and Pakistan is to find ways of increasing the other side's security without decreasing their own. This puts a premium on developing policies and practices that reassure both sides that each can continue to rely on the restraint of the other–especially in a crisis.***

Following on from the Manama dialogue, we organised another in-person track 2/1.5 dialogue between Indian and Pakistani participants (held in Istanbul, Turkey in February 2025). This dialogue was also grounded in BASIC's dialogical method and explored to what extent new responsible practices and policies might reduce the risks that EDTs pose to crisis management and prevention between India and Pakistan. The findings from the Istanbul dialogue in terms of policy recommendations are detailed in Part C of the report, jointly written by Indian and Pakistani scholars: Rabia Akhtar, Ruhee Neog, Hina Pandey, and Adil Sultan. Part C focuses on three levels of analysis discussed during the dialogue–the international, the bilateral, and track 2/1.5–all aimed at supporting and enhancing India and Pakistan's capacities to prevent crises and to manage those that may occur.

In exploring new policy possibilities that might reduce nuclear risks, the Istanbul dialogue highlighted the obstacles posed by both psychological and material factors–namely, peaceful/defensive self-images and the offence-defence differentiation problem. Discussions during the dialogue underscored what the Survey had indicated–how perceptions of technological asymmetry shape threat perceptions around the role that EDTs might play in future India-Pakistan crises. India is perceived to have a technological advantage over Pakistan, and the latter fears that this might increase India's confidence that it could achieve "escalation dominance"[18] over Pakistan in a future crisis. By contrast, India does not perceive its technological advantage over Pakistan as destabilising and tends to downplay Pakistan's claims of feeling threatened by India's technological lead in EDTs, arguing that its technological innovation must be seen in the context of the threat it faces from China.

Even if Indian decisionmakers were able to put themselves in the shoes of their Pakistani counterparts–no matter "how hard they pinch", as one participant in Istanbul put it–and recognise that India's technological edge in EDTs poses a threat to Pakistan, it is very difficult for India to reassure Pakistan that its development of EDTs is solely aimed at China. In this regard, the India-China-Pakistan relationship constitutes a particularly challenging of Glaser's conception of the security dilemma: military actions that India might take to reassure Pakistan risk increasing its vulnerability to Chinese coercion and attack.

18 The term was coined by the US nuclear strategist Herman Kahn in *On Escalation: Metaphors and Scenarios* (London: Pall Mall Press: 1965). Khan defined it as "a function of where one is on an escalation ladder [another concept coined by Kahn]. It depends on the net effect of the competing capabilities on the rung being occupied, the estimate by each side of what would happen if the confrontation moved to other rungs, and the means each side has to shift the confrontation to these other rungs. One variable affecting escalation dominance is each side's relative fear of eruption. That side, which has least to lose by eruption, or fears eruption the least, will automatically have an element of escalation dominance" (Khan, *On Escalation,* p.290).

The reassurance dilemma facing India is compounded by the concern that China is–or may in the future–provide Pakistan access to highly sophisticated Chinese EDT technology. India's anxiety about China's role is mirrored in Pakistan's concern that India is being given access to US technology. Pakistan perceives a growing collaboration between India and the United States widening the existing technological gap and undermining its capacity for assured destruction. In a security environment marked by distrust—where each side assumes the worst about the other's intentions—and by perceived technological asymmetries, it is difficult for either side to reassure the other that its technologies are intended solely for defensive purposes.

The Istanbul Dialogue generated a number of creative policy proposals and responsible practices aimed at breaking through the cognitive and structural rigidities that block the path to cooperation and mutual security. Akhtar et al. explore these in depth in Part C. They group them into three distinct, though related levels of engagement and intervention: (i) the international; (ii) the bilateral; and (iii) track 2/1.5. Ideas advanced include: improved channels of communication–integrating EDT discussions into existing hotlines and creating new ones in relation to cyber/AI threats; a new *Joint Working Group* tasked with reducing the risks that EDTs pose to crisis management and prevention; promoting new norms around responsible integration of AI into military postures, including unilateral or even bilateral commitments to keep a human in the decision-making loop for NC3 and AI-enabled warfare; and extending the 1988 Non-Attack Agreement to prohibit cyber attacks against each side's NC3 systems and related space-based assets.

The importance of reassurance of each other's security concerns is at the heart of the track 2/1.5 initiatives suggested by Akhtar et al. in Part C. However, the authors appreciate that implementing these policies and practices depends upon reducing the deep distrust that currently defines the relationship. Participants held differing views as to how far India-Pakistan security competition was driven by misperceptions (the security dilemma argument) or a result of deeply rooted clashes of interest. For proponents of the latter view, distrust is the appropriate response, with related policies of hedging, military opaqueness, and maintaining the ambiguity perceived critical to nuclear deterrence. For those who believe the conflict is a security dilemma, it is important to test out how far distrust is driven by misplaced fear–rather than aggressive intent–and the possibilities for overcoming this. Here, reassurance diplomacy has a critical role to play, though there is always the possibility it could be strategically misplaced, which advises caution in designing and implementing policies of reassurance. The challenge for India and Pakistan is to find ways of increasing the other side's security without decreasing their own. This puts a premium on developing policies and practices that reassure both sides that each can continue to rely on the restraint of the other–especially in a crisis. Critical to this–and a point we return to in the Conclusion–is the need to frame any future crisis not as a "competition in risk taking"[19]–Schelling's definition of brinkmanship—but rather as an opportunity for cooperative de-escalation.

Discussions in Istanbul also highlighted that the introduction of EDTs into the India-Pakistan strategic equation further entangles South Asian nuclear dynamics with broader regional and international dynamics. This results in two main challenges when it comes to mitigating the risks posed by EDTs to India-Pakistan crisis prevention and management. First, and related to what is discussed above, the intricacies of technologies transfers and deterrence relationships within the "Nuclear Tetraplex" complicate reassurance efforts. Here, not only India and Pakistan have a responsibility to reassure each other that their technologies are to be used for defensive purposes, but also third parties have a duty to reassure each side that third-party technologies will not be used to support one side's offensive actions against the other, especially in a crisis.

19 Thomas Schelling, *Arms and Influence* (New Haven: Yale University Press, 2008 (1966), p.91.

To what extent can crises escalate without risking nuclear conflict?

To what degree has luck played a role in preventing nuclear war in past crises, as opposed to bilateral crisis management mechanisms?

Is de-escalation a product of luck, or does it stem from shared restraint and responsible practices?

Second, discussions on regulating and managing EDTs to promote crisis stability in South Asia cannot be treated in isolation and should be contextualised within broader international efforts. By addressing South Asia in isolation, the risk is that India and Pakistan could get ahead of themselves and find themselves at a disadvantage, restraining the military use of technologies that are still "emerging" in South Asia–but are already developed and unregulated elsewhere. For example, as discussed by Akhtar et al., dialogue participants in Istanbul explored the possibility for India and Pakistan to make unilateral declarations on human control over NC3 and WMD-related EDTs, similar to the November 2024 joint statement made by the U.S. President Joe Biden and Chinese President Xi Jinping that decisions regarding the use of nuclear weapons should remain under human control, not artificial intelligence.[20] Whatever the benefits of such unilateral declarations, some participants considered that such efforts were not politically viable in the current global geopolitical environment—unless the initiative was first taken by the N5. Put differently, the lack of progress around international initiatives to regulate EDTs is impacting negatively on the prospects of regulating the military use of these technologies in South Asia.

The possibility of regulating EDTs –both in South Asia and internationally– through binding arms control agreements remains dim. While legal frameworks should remain the long-term goal, behaviour-based approaches focused on building new and agreed norms of behaviour based on restraint and responsibility around military use of EDTs could enhance crisis stability in the short term.[21] In South Asia, exploring nuclear responsibilities–particularly during bilateral crises–is crucial. A prevailing confidence in India-Pakistan relations suggests that both sides believe they can control and manage escalation, leading to an increasing escalation threshold in each crisis. However, this raises critical concerns: To what extent can crises escalate without risking nuclear conflict? To what degree has luck played a role in preventing nuclear war in past crises, as opposed to bilateral crisis management mechanisms? Is de-escalation a product of luck, or does it stem from shared restraint and responsible practices? Strengthening crisis prevention and management mechanisms in the India-Pakistan dyad amid technological developments requires careful consideration and proactive measures, including reassurance mechanisms and responsible practices outlined in this report.

20 Jarrett Renshaw, and Trevor Hunnicutt, 'Biden, Xi agree that humans, not AI, should control nuclear arms', *Reuters*, 17 November 2024, https://www.reuters.com/world/biden-xi-agreed-that-humans-not-ai-should-control-nuclear-weapons-white-house-2024-11-16/.

21 On this, see also Ulrich Kühn, and Heather Williams, 'Behavioral Arms Control and East Asia', *Journal for Peace and Nuclear Disarmament* 7(1) (2024): 143-156, https://doi.org/10.1080/25751654.2024.2337965; and Alexander H. Montgomery, and Amy J. Nelson.,'Ceci n'est pas une nuke? The impact of emerging militarised technologies on strategic stability', *Journal of Strategic Studies* (2025): 1-29, https://doi.org/10.1080/01402390.2024.2440799.

Part A

Perceptions of Emerging and Disruptive Technologies on Crisis Prevention and Management in South Asia

Eva-Nour Repussard

Introduction

Part A quantitatively examines the extent to which EDTs challenge the mutual confidence between both sides in relying on each other's restraint during crises. It does so by assessing the impact of EDTs on crisis prevention and management.

To achieve this, BASIC conducted a STREAM survey gathering insights from Indian, Pakistani, and international experts on how EDTs influence India and Pakistan's crisis management capabilities and the potential for these technologies to heighten the risk of future crises.

The first finding shows that, with regard to crisis prevention and management, all surveyed groups agree that there is a 'maturity gap' between India and Pakistan in relation to most EDTs assessed, however such a 'maturity gap' is dependent on the different technologies. Another finding is that almost all EDTs surveyed are perceived much more negatively by the Pakistani respondents in comparison to the Indian and non-South Asian groups. Finally, Quantum for C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) stands out in all surveyed groups as being an EDT with a potential beneficial impact on crisis prevention and management in South Asia.

Maiden flight of the Autonomous Flying Wing Technology Demonstrator from Chitradurga ATR.

> ***There is a 'Maturity-Perception Effect', in which overall, the more mature a technology is, the more disruptive it is perceived with regard to crisis prevention and management.***

Based on the survey data, several observations can be drawn:

1

AI for information warfare appears as the most controversial EDT with regard to its maturity level.

2

There is a 'Maturity-Perception Effect', in which overall, the more mature a technology is, the more disruptive it is perceived with regard to crisis prevention and management.

3

There is a potential bias in which nationals of the country which possesses and is developing the EDT perceives it more positively than participants from the country that does not have the technology developed to the same degree.

Finally, the report discusses why quantum for C4ISR appears to be an EDT that is perceived by all groups as having a potential beneficial impact with regard to crisis prevention and management.

PART I.

Methodology

Survey Design and Objectives	The primary aim of the survey was to gather expert opinions from India, Pakistan, and the wider international community on the perceived risks and opportunities posed by various EDTs on crisis prevention and management. The survey used the Systematic Technology Reconnaissance, Evaluation, and Adoption Methodology (STREAM), first developed by Popper et al.,[22] and then used by Favaro[23] to evaluate both emerging and established technologies across a range of criteria, including their impact on crisis management and prevention and their level of maturity within specific countries.
Participant Recruitment	Participants were selected based on their expertise in South Asian regional security and emerging and disruptive technologies. The recruitment process began with desk-based research to identify individuals knowledgeable in these domains. We also relied on our regional network, which helped identify and recommend additional participants. A total of 109 individuals were invited to participate in the survey, including a mix of Indian, Pakistani, and non-South Asian experts, all with demonstrable experience in EDTs and South Asia.
Survey Distribution and Structure	Between July and August 2024, BASIC sent out the survey to the selected participants. The survey was administered via Google Forms, with participants being informed that no question was mandatory. They were encouraged to skip questions if they were unfamiliar with certain technologies, ensuring that responses were only provided for technologies they had sufficient knowledge of. Following the STREAM Methodology, participants were asked to rate the impact of each technology on India-Pakistan crisis prevention and management mechanisms on a scale of 1 to 7, with 1 indicating a highly negative impact and 7 indicating a highly positive impact. Additionally, participants were asked to assess the maturity of each technology in both India and Pakistan, using a scale of 1 to 5, where 1 represented a mature technology and 5 an immature one. The survey comprised a total of 10 close-ended questions for each of the 11 selected EDTs.[24] An optional text box allowed respondents to explain their ratings for each question, offering qualitative insights alongside the quantitative data.

22 Steven W. Popper, Nidhi Kalra, Richard Silberglitt, Edmundo Molina-Perez, Youngbok Ryu, and Michael Scarpati, *Strategic Issues Facing Transportation, Volume 3: Expediting Future Technologies for Enhancing Transportation System Performance*, NCHRP Report 750 (Washington, D.C.: Transportation Research Board, 2013), https://doi.org/10.17226/22448.

23 Marina Favaro, *Weapons of Mass Distortion: A New Approach to Emerging Technologies, Risk Reduction, and the Global Nuclear Order* (London: Centre for Science and Security Studies, King's College London, 2021), https://www.kcl.ac.uk/csss/assets/weapons-of-mass-distortion.pdf; Marina Favaro, Neil Renic, and Ulrich Kühn, *Negative Multiplicity: Forecasting the Future Impact of Emerging Technologies on International Stability and Human Security* (Hamburg: Institute for Peace Research and Security Policy at the University of Hamburg, 2022), https://ifsh.de/en/publications/research-report/research-report-010.

24 The questions used to assess perceived impact on crisis management and prevention, and maturity, can be found in Annex 1.

Response Rate and Demographics	Out of the 109 individuals invited, 44 experts completed the survey, yielding a response rate of 40.4%. The respondents consisted of 13 Indians, 20 Pakistanis, and 11 from non-South Asian countries, with a relatively balanced gender distribution (21 women and 23 men). These respondents were drawn from a diverse range of backgrounds, including academia, think tanks, and non-governmental organisations, ensuring a well-rounded perspective on the selected technologies.
Selection of Technologies	The technologies assessed in the survey were chosen through a combination of desk-based research and consultations with South Asian experts. The 11 EDTs included in the study were selected for their relevance to regional security and crisis prevention and management, with technologies deemed not yet mature enough in the region being excluded. The selected technologies were: 1. Artificial Intelligence (AI) for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR); 2. AI for Information Warfare; 3. AI for Weapons and Effects; 4. AI for Cyber Operations; 5. Quantum Technologies for C4ISR; 6. Multiple Independently Targetable Re-entry Vehicles (MIRVs); 7. Hypersonic Cruise Missiles; 8. Ballistic Missile Defense (BMD) Systems; 9. Directed Energy Weapons (DEWs); 10. Non-Kinetic Anti-Satellite (ASAT) Capabilities; 11. Kinetic ASAT Capabilities. To ensure all participants had a uniform understanding of the technologies, participants were given definitions for each EDT surveyed.[25]
Bias and Limitation Data Analysis	This study is subject to certain limitations, most notably selection bias. Since many of the respondents were known to BASIC or our network, the pool of participants may not fully represent the broader spectrum of opinions within the region or the field of EDTs. Additionally, although we invited an equal number of participants from India, Pakistan, and outside of the region, the response rate from Pakistani participants was double that of Indian and non-South Asian participants. Despite these limitations, the survey provides valuable insights into how participants view the perceived risks and opportunities of EDTs in terms of their impact on crisis prevention and management in South Asia.

25 The definitions of each EDT can be found in Annex 2.

PART II.

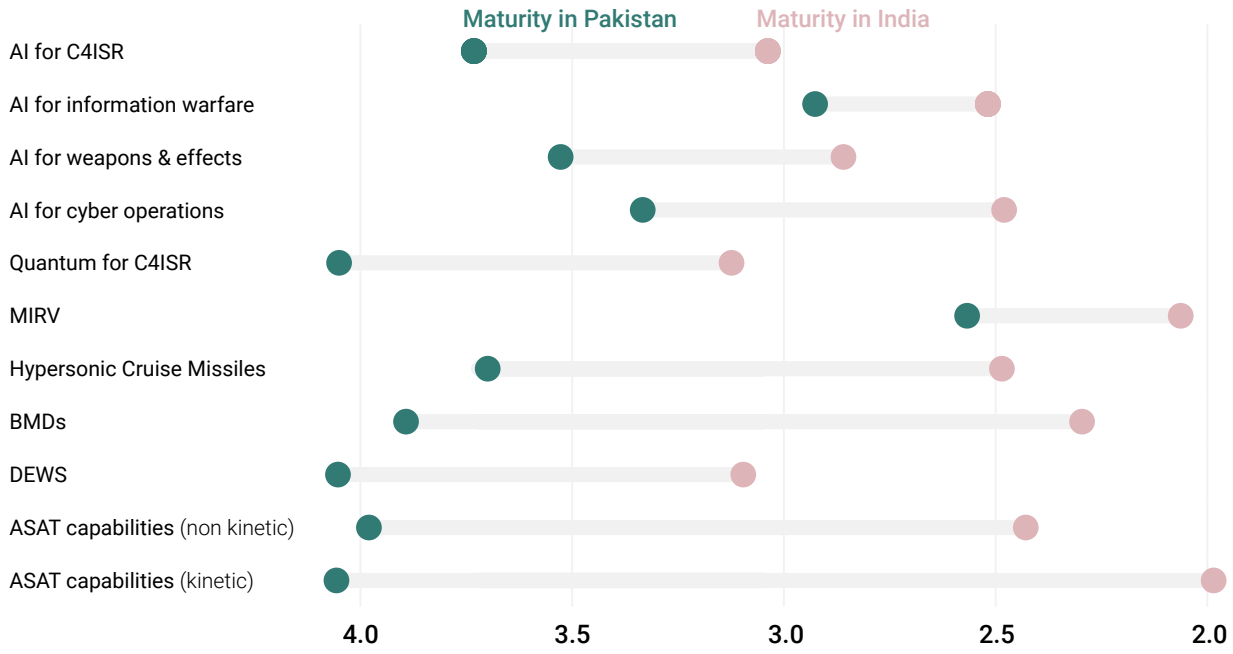
Findings

Maturity Gap

A significant trend that emerges from the data is that, in general terms, India is perceived to have achieved greater maturity in most of the EDTs assessed, compared to Pakistan. This trend is shared amongst the three groups. Within this dataset, the only technology which shows a divide amongst Indian and Pakistani participants is 'AI for Information Warfare' for which participants from both countries perceive the other country as being more advanced. Such findings will be discussed in the analysis section of the report.

The following figure shows maturity perception according to all survey respondents (Indians, Pakistanis, and non-South Asians).

Figure 1: Maturity of Emerging and Disruptive Technologies in India and Pakistan



When looking at the data of all participants together, India is perceived ahead with regard to all the EDTs surveyed. Some EDTs show a greater maturity gap between India and Pakistan, such as BMDs and ASAT capabilities, and empirical evidence does support that India is much more advanced than Pakistan in developing and integrating those capabilities.[26]

However, it is important to note that for some EDTs, the gap could be explained by the fact that in Pakistan, there is not as much publicly available information with regard to the development of EDTs on the military and strategic level than there is in India. Hence, the gap of maturity could also be explained as a gap of information.

26 Ghazala Yasmin Jalil, *India's Pursuit of Missile Shield: Challenges and Implications for Pakistan* (Islamabad: Institute of Strategic Studies Islamabad, 2024), https://issi.org.pk/wp-content/uploads/2024/08/IB_Ghazala_Aug_8_2024.pdf; Defence Research and Development Organisation (DRDO), Mission Shakti (New Delhi: DRDO, 2019), https://drdo.gov.in/mission-shakti.

EDTs Impact on India-Pakistan Crisis Prevention and Management

The two following tables show how the different groups (Indian, Pakistani, non-South Asians) scored EDTs with regards to their perceived impact on existing India-Pakistan crisis prevention and management mechanisms. The closer the score is to 1, the more negative the impact of the technology is perceived to be. The closer to 7, the more positive the impact of the technology is perceived to be. In the following two tables, darker shades of red indicate a stronger negative impact, white represents neutral or mixed results, and darker shades of green signify a more positive impact. The data is structured to show how each EDT's impact on crisis prevention and management is perceived differently across the diverse expert groups, reflecting a spectrum of opinions.

Figure 2: EDTs Impact on Crisis Prevention

	Indian Respondents	Pakistani Respondents	Non-South Asian Respondents
AI for C4ISR	4.0	4.0	3.8
AI for information warfare	2.8	2.6	2.5
AI for weapons and effects	3.4	2.9	2.9
AI for cyber operations	3.1	3.1	3.4
Quantum for C4ISR	4.5	4.6	4.6
MIRV	3.8	3.7	3.1
Hypersonic Cruise Missiles	3.6	2.3	3.5
BMDs	4.1	3.1	3.7
DEWS	3.9	3.6	3.7
ASAT capabilities (non kinetic)	3.5	2.6	3.5
ASAT capabilities (kinetic)	3.4	2.6	3.3

With regard to crisis prevention, most technologies were perceived to have a negative impact (identified in red in the table), and very few technologies were perceived as having a neutral or mixed impact (white) or a positive impact (green). Previous work conducted by BASIC in South Asia over the past few years seems to confirm this perception. Very few technologies are perceived to help prevent crises, and are rather perceived as a risk, potentially participating in the creation or worsening of crises. For example, the possible disruption of deep fake technology—a subset of AI for information warfare—has often been highlighted as potentially fuelling tensions in the South Asian context.[27]

Similarly, the use of AI technologies in all domains (cyber operation, information warfare, weapons and effects) was seen as potentially increasing the risks of misperceptions and misunderstanding, and participants at previous BASIC workshops have identified this technology as a potential vector to crises.[28]

27 Rabia Akhtar and Ruhee Neog, 'Tu Tu-Main Main: Policy, Scholarship, and India-Pakistan Communications', in Crisis Communications: Indian and Pakistani Perspectives on Responsible Practices, edited by Rabia Akhtar, Chiara Cervasio, Ruhee Neog, Alice Spilman, and Nicholas J. Wheeler (BASIC, 2023), https://basicint.org/compendium-crisis-communications-indian-and-pakistani-perspectives/.

28 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*.

Amongst all the EDTs assessed, quantum for C4ISR appears as a clear stand out, perceived quite positively across all groups, suggesting a consensus on its potential beneficial impact in aiding crisis prevention. In contrast, AI for information warfare received lowest scores overall, reflecting the general view that this EDT is perceived to have an extremely negative impact on crisis prevention.

Figure 3: EDTs Impact on Crisis Management

	Indian Respondents	Pakistani Respondents	Non-South Asian Respondents
AI for C4ISR	3.8	4.0	3.7
AI for information warfare	3.1	3.1	3.0
AI for weapons and effects	3.3	3.2	3.5
AI for cyber operations	3.4	3.5	3.3
Quantum for C4ISR	4.7	4.2	4.8
MIRV	3.6	3.5	3.5
Hypersonic Cruise Missiles	3.4	2.5	3.2
BMDs	4.0	3.3	3.8
DEWS	3.7	3.0	3.5
ASAT capabilities (non kinetic)	3.2	2.3	3.1
ASAT capabilities (kinetic)	3.3	2.5	2.9

With regard to crisis management, across all three groups, a similar assessment as the one made for crisis prevention can be made. Most technologies were perceived to have a negative impact on crisis management, whilst quantum for C4ISR is again rated quite positively by all groups, showing consistency in its perceived beneficial impact across both crisis prevention and crisis management. Meanwhile, technologies such as AI for information warfare, AI for cyber operations, and hypersonic cruise missiles are rated more critically, indicating that experts who have responded to the survey view them as having worse impacts on crisis management than on crisis prevention.

When comparing the data from Figure 2 to the one of Figure 3, several observations emerge:

- **Consistency of Technology Perception:** quantum for C4ISR's impact is perceived positively across both crisis prevention and crisis management by all groups. This consistency suggests a strong consensus about the constructive role this technology can play in both areas.
- **Crisis Prevention and Crisis Management Differences:** some technologies' scores tend to have a slightly worse impact on crisis prevention compared to their impact on crisis management. For example, AI for weapons and effects and AI for cyber operations are seen as having a more negative impact on crisis prevention than on crisis management. Another subset of technologies—ASAT capabilities and DEWs—are seen as having a worse impact on crisis management than on crisis prevention.
- **Divergence in Group Perspectives:** The difference in scores between Indian, Pakistani, and non-South Asian respondents remains visible in both datasets, with the Pakistani group having a generally more negative outlook on EDTs' impact than the Indian and non-South Asian group.

Overall, the comparison highlights that while some technologies like quantum for C4ISR are consistently viewed as beneficial, other EDTs are seen as more complex, some affecting more crisis prevention, other more crisis management, and some having a negative impact in both domains, reflecting different expectations and concerns depending on the specific context of either preventing or managing a crisis.

The Defence Research and Development Organisation (DRDO) successfully launched the Ballistic Missile Defence (BMD) Interceptor missile, in an Anti-Satellite (A-SAT) missile test 'Mission Shakti' engaging an Indian orbiting target satellite in Low Earth Orbit (LEO) in a 'Hit to Kill' mode from the Dr. A.P.J. Abdul Kalam Island, in Odisha on March 27, 2019.

> ***The difference in scores between Indian, Pakistani, and non-South Asian respondents remains visible in both datasets, with the Pakistani group having a generally more negative outlook on EDTs' impact than the Indian and non-South Asian group.***

PART III.

Analysis

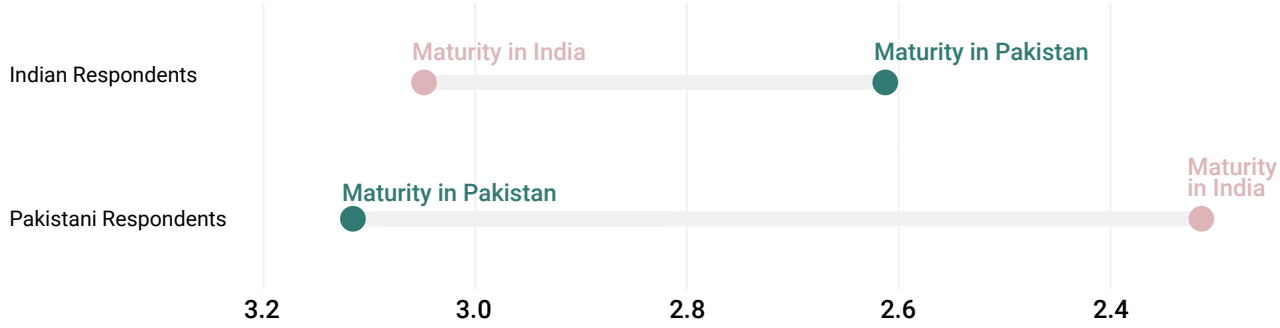
Four key observations emerge from the survey data.

First, AI for information warfare appears as the most controversial EDT with regard to maturity level with both Indian and Pakistan respondents perceiving the technology more mature in the other country. This perception stems largely from the inherently negative view of AI's role in information warfare. Second, there is a 'Maturity-Perception Effect', in which overall, the more mature a technology is, the more disruptive it is perceived with regard to crisis prevention and management when looking at the data from all participants. Third, the data shows a potential bias, wherein nationals from the country that possesses and is developing the EDT tend to view it more favourably than those from a country where a technology is less developed. This may explain why Indian participants consistently rated EDTs more positively than their Pakistani counterparts. Finally, the report seeks to explore why quantum technology for C4ISR is seen by all groups as having the potential for a positive impact on crisis prevention and management.

AI for Information Warfare

There are contrasting perceptions between Indian and Pakistani participants regarding the maturity of AI for information warfare. Pakistani participants view this technology as more mature in India than in Pakistan. Conversely, Indian participants perceive AI for information warfare as more mature in Pakistan than in India. This mutual perception of the other nation having greater maturity is unique in the eleven EDTs assessed.

Figure 4: Maturity of AI and Information Warfare



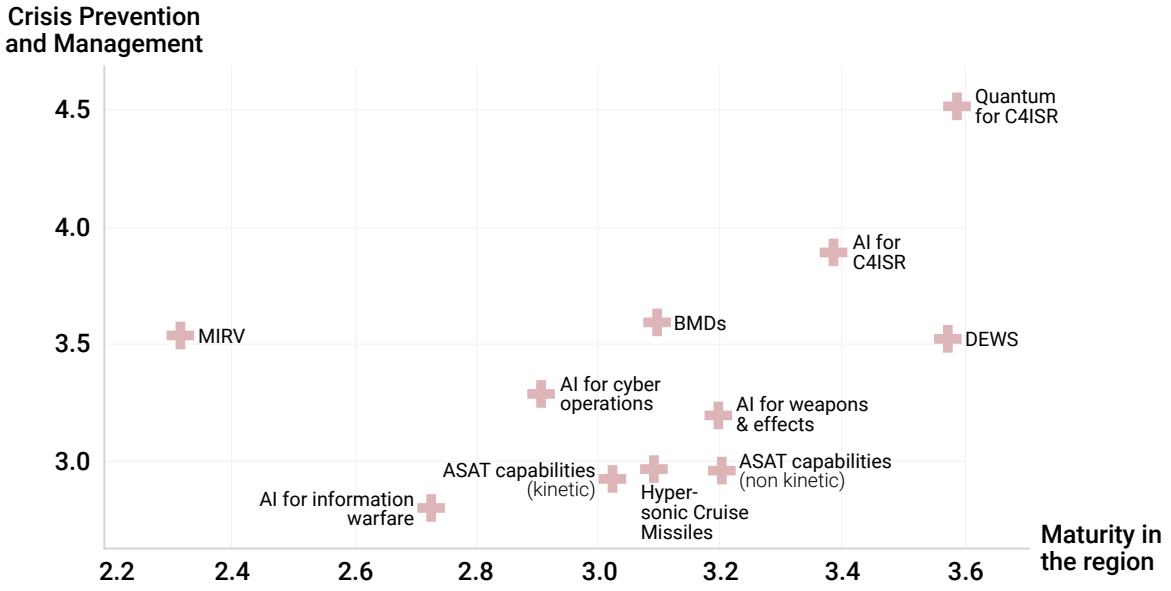
This can be attributed to the inherently negative connotations associated with AI in the context of information warfare, compared to the other EDTs assessed, which often have positive connotations. Whilst technologies like MIRV or ASAT are often a sign of prestige, and such capabilities are showcased by countries, AI for information warfare capabilities is not something that countries do highlight. AI for information warfare is often associated with tactics such as misinformation, psychological operations, and the manipulation of public opinion, all of which are viewed negatively because they can be used to deceive or destabilise opponents, rather than to strengthen stability. Indeed, both countries have often criticised the other for using information warfare against themselves.[29]

29 Maryam Noor, 'Indian Disinformation Campaigns against Pakistan'. *National Defence University*, Islamabad, 24 April, 2024, https://issra.pk/pub/insight/2024/Indian-Disinformation-Campaigns-against-Pakistan/Indian-Disinformation-Campaigns-against-Pakistan.html; Sarthak Ahuja and Samridhi Diwan, 'Information War: India's Disinformation Campaign against Pakistan', *Observer Research Foundation* (ORF), May 10, 2023, https://www.orfonline.org/expert-speak/indias-two-front-information-war.

Maturity-Perception Effect

A trend that emerged from the dataset from all participants is a correlation between maturity and perception. This correlation, or Maturity-Perception Effect, refers to the phenomenon where participants seemingly perceive mature EDTs more negatively compared to newer, less developed technologies. As EDTs mature and become more integrated into national defence frameworks, participants tend to view them with increased scepticism, focusing on their destabilising effects and potential risks to regional security.

Figure 5: EDT's Impact on Crisis Prevention and Management and Maturity in the Region



The Maturity-Perception Effect underscores the shifting nature of how EDTs are viewed by South Asian and non-South Asian participants. When technologies are nascent, they often seem to inspire hopes for innovation and enhanced deterrence. However, as these technologies mature and their strategic applications expand, respondents increasingly focus on the negative consequences—such as arms races, crisis instability, and the erosion of deterrence—leading to more pessimistic assessments of their long-term impact on regional stability.

It is however important to note that on that specific data set, MIRV technology appears as an outsider, which despite its maturity, is not seen as having as much of a negative impact as the other developed technologies. According to several participants of the survey, MIRV can be viewed as a damage-limitation strategy and a saving-face strategy, as coupled with BMDs could allow both sides to save face in a crisis. However, it could be argued that such a rating could be attributed to the fact that out of all the EDT surveyed, the perceived maturity gap between India and Pakistan is the smallest for MIRV technology (outside of AI for information), and according to the dataset, is the most developed EDT in Pakistan, and almost the most developed EDT in India. Thus, it could be argued that MIRV does not follow the Maturity-Perception Effect, because both states are almost at parity in its testing, development, and integration, and thus, strategic stability is maintained.

This image depicts a missile test of Agni-V in 2013, which is not MIRV equipped in this instance. However, in 2024, India successfully tested a MIRV-equipped Agni-V missile.

> ***Rather than offering purely objective assessments of a technology's impact on crisis prevention or management, respondents' views are maybe coloured by their own country's strategic position in relation to that technology.***

Strategic Bias

Another interesting trend that has emerged in the survey responses is a possible bias for certain technologies, when comparing responses from Indian and Pakistani participants when there is a proven and clear maturity gap between India and Pakistan. With regard to EDTs that only India possesses and/or has tested, Indian participants perceive the technology much more positively than their Pakistani counterparts—though Indian participants still generally assessed this category of technologies as having an overall negative impact on crisis prevention and management.

For instance, India has made significant strides in developing ASAT, BMDs, and hypersonic technologies, including its *Mission Shakti* in 2019,[30] which demonstrated India's kinetic ASAT capability. In contrast, Pakistan lacks comparable ASAT capabilities, which likely influenced the more critical view expressed by Pakistani respondents. Similarly, India's ballistic missile defence programme[31] and hypersonic weapons development[32] are much more advanced than those in Pakistan, possibly explaining why Indian respondents were more inclined to see these technologies not contributing as negatively to crisis prevention and management.

30 DRDO, *Mission Shakti*.

31 The Hindu Bureau, 'DRDO Successfully Tests Phase-II Ballistic Missile Defence System', *The Hindu*, July 25, 2024, https://www.thehindu.com/sci-tech/science/drdo-successfully-tests-phase-ii-ballistic-missile-defence-system/article68442838.ece.

32 Prateek Tripathi, 'How Hypersonic Weapons Are Redefining Warfare', *Observer Research Foundation*, 2024, https://www.orfonline.org/expert-speak/how-hypersonic-weapons-are-redefining-warfare.

This potential bias must be considered when interpreting the data, as it highlights how national interests and access to technologies can shape expert opinions. Rather than offering purely objective assessments of a technology's impact on crisis prevention or management, respondents' views appear to be coloured by their own country's strategic position in relation to that technology. In a sense the data seems to show that for participants, EDTs rarely have an inherent positive or negative impact on crisis prevention and management, rather their impact is perceived in relation to whether a country has developed said technology, and whether the adversarial state possesses it as well.

Quantum for C4ISR: A Hopeful Horizon?

Quantum technology for C4ISR emerges as a notable exception amongst the technologies assessed, with the three groups of participants acknowledging its potential to positively impact India-Pakistan crisis management and prevention.

The promise of quantum technology lies in its ability to improve ISR through quantum sensing. If successfully integrated, quantum sensing applications could help ISR in GPS-denied environments, or could improve air-based ISR through cloud cover and smoke.[33] Additionally, quantum sensors could also enable military personnel to detect underground structures or nuclear materials.[34] Furthermore, quantum technology could strengthen communication, as it promises to enable ultra-secure communication, sometimes referred to as 'unhackable', and thus could help prevent interception from adversaries.[35]

However, as highlighted earlier with the Maturity-Perception Effect, the current lack of maturity of this technology means that its possible positive impact on crisis prevention and management is potentially explained by the lack of maturity of this technology in South Asia. As the technology will begin to be developed in either or both of the countries, people might see the technology with much more scepticism and focus on the destabilising effects, such as quantum computers capability to potentially decrypt classified information stored on encrypted media, or the deployment of quantum sensors that would lead to significant improvements in submarine detection.[36]

And as highlighted with the Strategic Bias effect, this positive view of quantum for ISR is also potentially explained by the fact that neither India or Pakistan are close to having it integrated into their military, and are therefore at parity. Therefore, it could be that as soon as one of the two states makes a significant stride in quantum technology, it is likely to be seen much more negatively by the other state.

33 Edward Parker, *Commercial and Military Applications and Timelines for Quantum Technology*, (Santa Monica, CA: RAND Corporation, 2021), https://www.rand.org/pubs/research_reports/RRA1482-4.html.
34 Kelley M. Sayler, *Defense Primer: Quantum Technology*, (Congressional Research Service, 2024), https://www.congress.gov/crs-product/IF11836.
35 Parker, *Commercial and Military Applications and Timelines for Quantum Technology*.
36 Parker, *Commercial and Military Applications and Timelines for Quantum Technology*.

Part B

Unpacking EDT Perceptions: Drivers and Implications for Crisis Prevention and Management in South Asia

Mhairi McClafferty

Introduction

In November 2024, BASIC hosted a Track 1.5 dialogue in Manana, Bahrain.

It brought together experts and officials (current and former) from Indian and Pakistani nuclear policy communities to examine perceptions of Emerging and Disruptive Technologies (EDTs) in South Asia. The dialogue aimed to test the quantitative findings outlined in Part A of this report.

A key takeaway from the dialogue is that the long standing distrust between India and Pakistan shapes how each country perceives the other's technological advancements. Both countries interpret EDTs through a lens of strategic insecurity, which exacerbates fears and complicates crisis management efforts. The dialogue also underscored that technological disparities between India and Pakistan, fueled by strategic partnerships with global powers, intensify security concerns, perpetuating existing relations of distrust.

Part I of this section of the report provides an analysis of the key technologies discussed during the dialogue, including AI for information warfare, AI for cyber operations, quantum technologies, BMDs and MIRVs. It examines their potential risks and opportunities for regional stability, and how they could undermine the culture of restraint that has historically helped manage India-Pakistan crises. This section also highlights the need for updated mechanisms and strategies to address the challenges posed by these technologies to India-Pakistan crisis management. Part II delves into the broader factors that shape perceptions of EDTs in South Asia, exploring how distrust, fueled by cognitive biases, technological asymmetries, and strategic partnerships, influence each country's perceptions of these technologies.

PART I.

Challenges Posed by EDTs to India-Pakistan Crisis Management and Prevention

While India and Pakistan have historically maintained strategic stability through a culture of restraint–predicated on each side's confidence in the continuing restraint of the other in times of crisis–the rise of new technologies poses new challenges to this regime of mutual confidence.[37]

EDTs look set to transform the security landscape in ways that challenge existing mechanisms for both crisis management and prevention. By drawing on insights from the Manama dialogue and BASIC's previous work, this section explores how these technologies create destabilising risks by blurring the lines between offensive and defensive capabilities, increasing the potential for misunderstandings and fuelling distrust. But this section also shows how EDTs may present new opportunities for improving crisis management and prevention.

1.1 Evaluating the Impact of Five Key EDTs

From the eleven EDTs presented in the survey and discussed in Part A of this report, dialogue participants selected five key technologies to further unpack. These were: AI for information warfare, AI for cyber operations, quantum for C4ISR, BMD systems, and MIRVs.

- **AI for Information Warfare:** Both the survey and dialogue highlighted that AI for information warfare poses significant risks to crisis management in South Asia and increases the likelihood of crises occurring. Participants from both India and Pakistan expressed concerns about the potential use of AI for disinformation campaigns, deep fakes, and the manipulation of public opinion. For example, disinformation spread through deep fakes on social media channels could initiate a crisis and its possible escalation, further complicating crisis management.[38]

  In the dialogue, these concerns were underscored, with participants discussing how AI-enabled disinformation could deepen distrust between India and Pakistan. However, the dialogue also explored the potential for AI to mitigate these risks. Specifically, AI could be used to quickly detect and counter disinformation, helping to prevent misunderstandings and reduce the likelihood of miscalculations that could lead to escalation.

  Advanced AI-driven technologies can analyse patterns, language use, and content to support tasks like content moderation, fact-checking, and detecting misinformation.[39]

- **AI for Cyber Operations:** Both the survey and dialogue participants identified AI for cyber operations as a technology with the potential to escalate tensions between India and Pakistan. A major concern is the rapid

37 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*, p.22.

38 Saima Aman Sial, 'Military applications of artificial intelligence in Pakistan and the impact on strategic stability in South Asia', in Vincent Boulanin, *The Impact of Artificial Intelligence on Strategic Stability: Volume III: South Asian Perspectives* (Stockholm International Peace Research Institute: 2020), p.49, https://www.sipri.org/publications/2020/research-reports/impact-artificial-intelligence-strategic-stability-and-nuclear-risk-volume-iii-south-asian

39 Cathy Li, and Agustina Callegari, 'Stopping AI disinformation: Protecting truth in the digital world', *World Economic Forum*, 14 June 2024, https://www.weforum.org/stories/2024/06/ai-combat-online-misinformation-disinformation/#:~:text=It%20also%20plays%20a%20crucial,the%20detection%20of%20false%20information.

pace of AI-driven cyber operations, which significantly shortens decision-making timelines. Participants also noted that AI-driven cyber operations could undermine established Confidence-Building Measures (CBMs), such as the Agreement on the Prohibition of Attack Against Nuclear Facilities (1988).[40]

While the 1988 Non-Attack Agreement focuses primarily on preventing direct attacks on nuclear installations, it does not explicitly cover cyber attacks that might target Command, Control, Communications, and Intelligence (C3I) systems–critical infrastructure for managing and operating nuclear arsenals. These systems, which support decision-making and communication in crises, are increasingly vulnerable to cyber attacks, such as hacking and malware, which disrupt operations or cause misinterpretations during a crisis, potentially leading to unintended escalation.[41] As such, the Non-Attack Agreement does not fully account for growing cyber risks to nuclear stability.[42]

However, AI-driven cyber operations could offer potential benefits, particularly in detecting and mitigating cyber attacks in real time. By analysing vast amounts of data to identify abnormal patterns and potential threats, AI enhances decision-making and strengthens network intrusion detection. AI-driven systems enhance the ability to manage the impacts of cyber attacks by enabling real-time threat detection and response whilst significantly reducing false positives. By improving accuracy and reducing misinterpretations, AI can help prevent unnecessary retaliatory actions, lowering the risk of escalation in crisis scenarios.

- **BMD Systems and MIRVs:** The dialogue revealed that BMD systems and MIRVs, while distinct, are often interconnected in their strategic implications. MIRVs are designed to carry multiple warheads, each capable of independently targeting and striking different targets.[43] BMDs, on the other hand, aim to strengthen the survivability of retaliatory capabilities by protecting critical assets, such as missile launchers, warhead storage sites, and command-and-control structures.[44]

  However, while BMDs offer defensive benefits, adversaries often fear that they might be used as part of a pre-emptive strike where the purpose of the BMD is to protect against whatever retaliatory capabilities an adversary can launch after suffering a pre-emptive attack.[45] This complex interplay explains why participants in the dialogue discussed these technologies together.

  Yet, they also emphasised the risks associated with their development and deployment in a South Asian context. India's development of BMD systems has heightened Pakistan's focus on MIRVs as a countermeasure, reinforcing a cycle of competitive military advancements.[46] This arms race dynamic increases the likelihood of misperceptions and miscalculations during crises, as each side may question whether it can rely on the continued restraint of the other.

  The presence of BMD systems, perceived as enabling offensive actions, coupled with the deployment of MIRVs, widely viewed as first-strike weapons, exacerbates this uncertainty. The "use them or lose them" dilemma introduced by MIRVs, along with the pressure of rapid decision-making, threatens crisis stability.[47] As Thomas Schelling argued in his 1984 article 'Confidence in Crisis', reducing the risk of conflict requires both sides to maintain confidence in the other's restraint and reject preemptive temptations.[48]

  The continued development of BMDs and MIRVs in the South Asian context risks eroding the fragile confidence that both sides have had in the other's continuing restraint.

40 Agreement between India and Pakistan on the Prohibition of Attack Against Nuclear Installations and Facilities (India-Pakistan Non-Attack Agreement), 31 December 1988, https://www.nti.org/wp-content/uploads/2021/09/india_pakistan_non_attack_agreement.pdf.

41 Sial, 'Military applications of artificial intelligence in Pakistan', p.49.

42 Aya H. Salem, Safaa M. Azzam, O.E. Emam, and Amr A. Abohany, 'Advancing cybersecurity: a comprehensive review of AI-driven detection techniques', *Journal of Big Data 11*(105) (2024), p.6, https://doi.org/10.1186/s40537-024-00957-y.

43 Zohaib Altaf, and Nimrah Javed, 'The Triad of Technology and Its Implications for Strategic Stability in South Asia', *South Asia Voices*, Stimson Center, 2 May 2024, https://southasianvoices.org/sec-c-pk-r-triad-of-technology-05-02-2024/

44 Akhtar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.102.

45 Akthar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.102.

46 Adil Sultan, M*issile developments in South Asia: a perspective from Pakistan* (International Institute for Strategic Studies, 2021), p.3, https://www.iiss.org/research-paper/2021/05/missile-developments-south-asia/.

47 Akthar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.102.

48 Thomas Schelling, 'Confidence in Crisis', *International Security* 8(4) (1984), p.57, https://doi.org/10.2307/2538562.

- **Quantum for C4ISR:** Quantum technologies for C4ISR were perceived more optimistically in the STREAM survey than in the dialogue, with both Indian and Pakistani respondents emphasising their potential to benefit crisis management. However, as discussed in Part A of this report, such a more positive view could be explained by the fact that neither India nor Pakistan are close to having quantum technologies fully integrated into their militaries.

  Analysis from the survey indicated that this could have been explained by the 'maturity-perception effect', where opinions are more likely to be positive due to the technology being in the early stages of development. However, the dialogue provided more insights into perceptions of quantum technology, including more skeptical views. Indeed, the current lack of maturity in the technology on both sides could trigger security dilemmas, as one of the parties may perceive an adversary's potential advancements as an existential threat, giving them a strategic edge, even if those advancements are not fully realised in practice.[49]

  Some dialogue participants highlighted the asymmetry in technological maturity, with India perceived to have a greater advancement in quantum technologies. This technological edge is seen as giving India a perceived strategic advantage that it could potentially leverage in future crises. Both countries are concerned that the other's advancements in quantum technology could shift the strategic balance, heightening fears of technological vulnerability.

  Participants also raised concerns about the rapid processing and real-time capabilities of quantum systems, which could increase the threats posed by cyber attacks, particularly to critical infrastructure like nuclear C3I systems. The fear intensifies if one side believes it has a technological edge, as this could provoke fears of a preemptive cyber strike.[50]

  Participants highlighted the uneven pace of technological progress and the increased risks of cyber warfare and escalation in a crisis. The belief that an adversary might possess a technological edge–whether real or perceived–reinforces the context-driven nature of technological perceptions. As such, while quantum technologies hold promise for enhancing stability, their uncertain developments and the perceptions they generate could exacerbate insecurity and destabilise the region.

1.2 Challenges to the Culture of Restraint

In light of the evolving security landscape in South Asia, there is an urgent need for mechanisms that can reinforce crisis prevention and management, especially as EDTs introduce new risks to regional stability. As identified in BASIC's 2024 report: *Crisis Management and Prevention in South Asia: Mutual Confidence, Risks, and Responsibility*, India and Pakistan have managed to maintain strategic stability through a culture of restraint, supported by four mechanisms: (i) intimate enmity, (ii) face-saving narratives, (iii) CBMs, and (iv) reliance on third parties to control escalation.[51] However, with the rise of EDTs, this culture of restraint is under increasing strain.[52]

Dialogue participants expressed confidence in the continuation of this culture as essential for maintaining regional stability. However, they highlighted several challenges posed by EDTs that could undermine this culture and escalate tensions. Without robust crisis communication mechanisms or other Confidence-Building Measures (CBMs) to mitigate the risks posed by EDTs, several challenges emerge:

49 Akthar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.108.
50 Akthar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.108.
51 The sources of confidence in South Asia's nuclear restraint are discussed comprehensively in Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*.
52 Cervasio, Wheeler, and McClafferty, Crisis Prevention and Management in South Asia, p.21.

1. Offence-Defence Differentiation

The first challenge is that EDTs heighten the problem of offence-defence differentiation—distinguishing between whether weapons are intended for offensive or defensive purposes.[53] Even when the technologies are intended for defensive or stabilising purposes, the fact that they also have offensive potential means that adversaries invariably interpret such capabilities as indicative of hostile intent. For example, AI, which might be intended to enhance military readiness or support better decision-making, can also be a tool for improving precision and the effectiveness of strikes.[54] When offensive and defensive capabilities appear indistinguishable, decision-makers are more likely to assume the worst about the others intentions. The ambiguity surrounding the intended use of EDTs and the inability to distinguish between offensive and defensive roles exacerbates fears and drives security competition.

2. Compressed Decision-Making Time:

The second challenge is the compression of decision-making time that crisis managers will face in a future EDT strategic environment. This poses new challenges for Indian and Pakistani decision-makers who already interact in a space characterised by very short flight and warning times. The worry is that human decision-makers could become overwhelmed by the speed of information, leading to faulty and irrational decision-making that produces escalatory dynamics in times of crisis. One possible response to this is increased reliance on AI to support human decision-making, but one major downside of this—as a number of simulations have shown—is the risk that the AI might recommend to crisis managers that they employ brinkmanship strategies aimed at securing escalation dominance.[55]

3. Weakened Crisis Management Frameworks

The unpredictable impact that the introduction of EDTs might have on decision-making in a crisis complicates the challenge of de-escalating a crisis, underlining the importance of strengthening crisis management protocols and mechanisms, as well as the urgency of bringing EDTS under a regime of regulation.[56] If AI, cyber, and quantum technologies continue to be developed by India and Pakistan follows suit in relation to AI and quantum where it is less advanced than India, then in a context of proliferating offensive MIRV systems and the growth of missile defence systems, South Asian crisis managers could find themselves facing critical "use them or lose them" dilemmas in a time of intense crisis. Leaving aside the worrying possibility that the human-machine interface could trigger deliberate escalation by one or both sides as stress-laden human decision-makers rely on AI, there is also the risk of inadvertent or unintended escalation arising through a fog of misperceptions as each side misreads the other's signals as preparations for attack. This highlights the urgent need for mechanisms and strategies to strengthen India-Pakistan crisis management capacities, ensuring that even if EDTs remain unconstrained, they do not serve to critically undermine the existing culture of confidence.

Despite these challenges, dialogue participants expressed confidence in the continuation of this culture of restraint as a stabilising force in South Asia. However, they acknowledged that the evolving landscape presents significant challenges to traditional crisis management frameworks.

53 Jervis, 'Cooperation Under the Security Dilemma'.

54 Akhtar, and Sethi, 'Emerging Technologies and Southern Asian Nuclear Deterrence', p.109.

55 Anthony Aguirre, Emilia Javorsky, and Max Tegmark, "Artificial Escalation': Imaging the future of nuclear risk', Bulletin of Atomic Scientists', 17 July 2023, https://thebulletin.org/2023/07/artificial-escalation-imagining-the-future-of-nuclear-risk/; Cameron Vega, and Eliana Johns, 'Humans should teach AI how to avoid nuclear war—while they still can', Bulletin of Atomic Scientists, 22 July 2024, https://thebulletin.org/2024/07/humans-should-teach-ai-how-to-avoid-nuclear-war-while-they-still-can/.

56 Rizwana Abbasi, 'The use of EDTs in Ukraine could offer lessons for military strategies in South Asia', *European Leadership Network*, 11 October 2024, https://europeanleadershipnetwork.org/commentary/the-use-of-edts-in-ukraine-could-offer-lessons-for-military-strategies-in-south-asia/.

PART II.

What Drives Perceptions of EDTs in South Asia?

Building on the discussion of how EDTs challenge the possibilities for crisis management in South Asia, this section examines the underlying factors shaping perceptions of these technologies.

While Part I focused on the destabilising risks and limited opportunities posed by specific technologies, this section explores the underlying psychological drivers of how these technologies are viewed.

The dialogue identified distrust as a central factor in shaping perceptions of EDTs in South Asia. Distrust shapes how each country interprets the other's technological advancements. While technologies are not inherently perceived as negative, their impact is amplified by key drivers such as strategic insecurities, uncertainty surrounding new technologies, and limited publicly available information in both countries on EDTs. Distrust underpins the key drivers of perceptions of EDTs in South Asia explored in this section–cognitive biases, technological asymmetries, and strategic partnerships.

2.1 Cognitive Biases

India and Pakistan both maintain a "peaceful/defensive self-image"[57] when framing their technological developments, presenting these as essential for national security and regional stability. Robert Jervis classically explained the pernicious security dynamics generated by such a self-image in the following terms: policy-makers fail to "recognise that one's own actions could be seen as menacing and the concomitant belief that the other's hostility can only be explained by its aggressiveness".[58] The key cognitive bias that drives actors into thinking this way is their core assumption that others know that their intentions are peaceful. But of course, others have no such assurances and as a result, they come to impute malign intent to behaviour that others believe is transparently defensive. For example, India views its development of BMD systems as crucial for protecting itself from potential missile threats and reinforcing its deterrent capabilities.[59]
Similarly, Pakistan's nuclear and missile advancements, such as MIRV technology, are framed as purely defensive, intended counter to India's growing conventional military and technological capabilities.[60]

The resulting security dilemma dynamics[61]—or spiral model[62] to use Jervis's term—create a spiralling security competition where what each side believes are defensively motivated actions are perceived as inherently offensive by the other. During the dialogue, it was highlighted that, in the case of India and Pakistan, the peaceful/defensive self-images held by both countries deepen mutual distrust, as each side perceives its own

57 The term was coined by Ken Booth and Nicholas J. Wheeler in their 2008 book, *The Security Dilemma: Fear, Cooperation and Trust in World Politics*. The idea develops out of Robert Jervis's classic exposition of the "spiral model" concept (see Jervis, *Perception and Misperception in International Politics*); see also Nicholas J Wheeler, *Trusting Enemies: Interpersonal Relationships in International Conflict* (Oxford: Oxford University Press, 2018).

58 Jervis, *Perception and Misperception in International Politics*, p.75.

59 Rahul B. Wankhede, 'Evolution of India's Ballistic Missile Defence Program: Prospects and Challenges', *Journal of United Service Institution of India*, CLIII(634) (2023): https://www.usiofindia.org/publication-details.php?id=324.

60 Centre for Strategic and International Studies, 'Missiles of Pakistan', *Missile Threat*, last modified 30 June 2022, https://missilethreat.csis.org/country/pakistan/.

61 Booth, and Wheeler, *The Security Dilemma*; Wheeler, *Trusting Enemies*.

62 Jervis, *Perceptions and Misperceptions in International Politics*.

actions as stabilising and defensive while viewing the other's actions as offensive, thereby exacerbating insecurity in the region.

The flip side of peaceful/defensive self-images is the concept of enemy images, which involve viewing the other state as inherently hostile, untrustworthy, and motivated by aggressive intentions.[63] Enemy images lead to the belief that the adversary's actions, no matter how they are framed, are designed to undermine one's security.[64] For example, Pakistan perceives India's BMD systems as threatening its nuclear deterrent,[65] despite India's insistence that these systems are defensive. Similarly, India views Pakistan's MIRV capabilities as destabilising, fearing they could overwhelm its missile defence and neutralise its deterrent posture.[66]

Perceptions of EDTs in South Asia are significantly shaped by these cognitive biases, where each country's interpretation of EDTs is influenced not by the technologies intended purpose or actual functionality, but by long standing tensions and strategic insecurities. The dialogue highlighted that what matters most is not the "objective truths" about EDTs, but how they are perceived in the context of the broader security competition. In this context, the objective reality or intended use of these technologies become secondary to the subjective interpretations held by each country. Rather than focusing on the capabilities of the technology itself, perceptions are shaped by fears about how these technologies might be used to further the other side's strategic aims. EDTs are therefore viewed as tools for offensive purposes, reflecting the deep rooted distrust between India and Pakistan.

At the dialogue, it was emphasised that technologies cannot be stabilising for the region if they are only perceived as such by one side. If one side sees a technology as defensive but the other views it as offensive, it cannot achieve the intended stabilising effect. This ambiguity around the intended use of EDTs, coupled with a lack of transparency, forces both India and Pakistan to assume the worst about each other's intentions, reinforcing enemy images.[67] Perceptions of EDTs are not shaped by their actual capabilities but by how each side interprets their potential threat, deeping the cycle of distrust and insecurity.

Ultimately, the interplay of self-images and enemy images, compounded by the difficulty in distinguishing offensive and defensive capabilities, leads to a spiraling security dilemma where each side perceives the other's defensive actions as offensive, reinforcing negative perceptions and complicating efforts for stability.

2.2 Technological Asymmetries

Technological asymmetries between India and Pakistan deepens distrust, as they contribute to shaping each country's perceptions of EDTs and their potential implications for regional security. These asymmetries, whether real or perceived, create an environment where both sides view the other's advancements as threatening, reinforcing a cycle of suspicion and fear. For example, India's investment in quantum technologies, missile defence systems, and AI are framed as necessary steps to modernise its defence capabilities and counter potential threats.[68] However, Pakistan perceives these developments as an attempt to tilt the strategic balance in India's favour, undermining its own deterrent capabilities.[69]

63 Wheeler, *Trusting Enemies*, p, 75.
64 Wheeler, *Trusting Enemies*, p.75.
65 Ghazala Yasmin Jalil, *India's Pursuit of Missile Shield: Challenges and Implications for Pakistan*, Issue Brief (Islamabad: Institute of Strategic Studies Islamabad, 2024), p. 4, https://issi.org.pk/issue-brief-on-indias-pursuit-of-missile-shield-challenges-and-implications-for-pakistan/.
66 Jalil, India's Pursuit of Missile Shield, p. 4.
67 Wheeler, *Trusting Enemies*, p.75.
68 Ladhu R. Choudhary, 'India's Military Modernization Efforts Under Prime Minister Modi, *South Asian Voices*, Stimson Center, 22 May 2024, https://www.stimson.org/2024/indias-military-modernization-efforts-under-prime-minister-modi/.
69 Altaf, and Javed, 'The Triad of Technology and Its Implications for Strategic Stability in South Asia'.

> ***External support for advanced technologies, coupled with limited transparency, leads each side to interpret the other's advancements as offensive and destabilising.***

The technology imbalance between India and Pakistan adds another layer of complexity that further exacerbates distrust. India has already started heavily investing in the development of quantum technologies,[70] while Pakistan's quantum initiatives are in the early stages.[71] During the dialogue, it was highlighted that this asymmetry deepens the distrust between the two countries and raises concerns about the potential for something that might resemble an arms race, particularly if Pakistan were to acquire advanced quantum technologies through external partnerships.[72]

These dynamics underscore how technological asymmetries directly shape perceptions of EDTs and deepen distrust. The belief that the other side's advancements are designed to exploit these asymmetries heightens insecurity, fostering an environment where preemptive actions and reactive strategies dominate.[73] The lack of transparency about the true intent behind technologies exacerbates this problem, as each side interprets the other's actions as offensive and destabilising.

Technological asymmetries heighten insecurities because each country may view the other's advancements as a threat to its own strategic position. When one side perceives the other as gaining a technological edge, it can lead to suspicions, miscalculations, and escalation. The perception of technological imbalance can significantly affect regional stability, as both countries view the other's advancements as threatening to their security and strategic posture.

2.3 The Role of Strategic Partnerships in Exacerbating Technological Asymmetries

Strategic partnerships play a crucial role in exacerbating technological asymmetries and deepening distrust between India and Pakistan. The dialogue highlighted how the alignments of India and Pakistan with major powers–India with the US and Pakistan with China–amplify the existing tensions and introduce new layers of complexities. Advanced technologies acquired or developed through these partnerships–such as quantum tools or AI for military applications–fuels concerns about a shifting power balance in the region, eroding strategic stability.[74]

70 James Dargen, 'India's National Quantum Mission $726M Investment To Compete With Global Quantum Technology', *Quantum Insider*, 24 May 2024, https://thequantuminsider.com/2024/05/24/indias-national-quantum-missions-726m-investment-to-compete-with-global-quantum-technology/.

71 Zohaib Altaf, and Nimrah Javed, 'Pakistan's Quantum Quest: Hurdles and Hopes', *The Diplomat*, 27 June 2024, https://thediplomat.com/2024/06/pakistans-quantum-quest-hurdles-and-hopes/.

72 Ankit Tiwari, 'The Security Implications of Quantum Computing and India's National Quantum Mission', *The Diplomat*, 9 June 2023, https://thediplomat.com/2023/06/the-security-implications-of-quantum-computing-and-indias-national-quantum-mission/.

73 Altaf, and Javed, 'Pakistan's Quantum Quest'.

74 Muhammad Ahmad Khan, 'India-US Strategic Convergence: Implications for Strategic Balance in South Asia', *NDU Journal* 37 (2023), p.51 https://ndujournal.ndu.edu.pk/site/article/view/153.

The erosion of strategic stability is a potential consequence of technological asymmetries fueled by strategic partnerships. Pakistan, in particular, feels vulnerable due to India's superior technological capabilities and its access to advanced technologies through strategic partnerships, especially with the US.[75] This sense of vulnerability prompts Pakistan to accelerate its military modernisation, often in collaboration with China.[76] India is not reassured by Pakistan's claim that such capabilities are only for defensive purposes and such actions are seen as confirmation of Pakistan's hostile intent. How far both sides are operating here with peaceful/defensive self-images is a matter of great contention, the answer to which has profound policy implications.

A critical aspect of this dynamic is how each country perceives the other's strategic relationships. India's growing collaboration with the US, particularly in advanced technology transfers, is primarily aimed at countering China, but is perceived by Pakistan as destabilising by widening the technological gap and undermining its deterrent capabilities.[77] Conversely, Pakistan's reliance on China for technologies is more directly targeted to counter India's growing capabilities,[78] further intensifying India's concerns and prompting accelerated military modernisation to counter perceived threats.[79]

This cycle of action and reaction fosters tailored deterrence strategies, with each country focusing on countering the perceived threats bolstered by external support. For instance, India's missile systems, developed partly through US collaboration, are seen by Pakistan as a direct challenge to its security, prompting it to strengthen its ties with China for similar advancements.[80] This dynamic fuels competition, deeping distrust, and increases the risk of an arms race.

Strategic partnerships also complicate efforts to stabilise the region by feeding into worst-case scenario thinking. External support for advanced technologies, coupled with limited transparency, leads each side to interpret the other's advancements as offensive and destabilising. This perception reduces the scope for reassurance and dialogue, locking both countries into a cycle of military buildup and strategic posturing.

75 Shyan Hassan Jamy, and Ahmad Ali, 'Growing India-US Technology Collaborations: Implications for Pakistan', *The Diplomat*, 13 June 2023, https://thediplomat.com/2023/07/growing-india-us-technology-collaboration-implications-for-pakistan/.

76 Khan, 'India-US Strategic Convergence', p.47.

77 Jamy, and Ali, 'Growing India-US Technology Collaborations'.

78 Khan, 'India-US Strategic Convergence', p.53.

79 Muhammad Shareh Qazi, 'Between "Cyber Insecurity" and Modern Warfare: The Precarious Tightrope of Deterrence Stability in South Asia', *South Asian Voices*, Stimson Center, 27 June 2024, https://www.stimson.org/2024/between-cyber-insecurity-and-modern-warfare-the-precarious-tightrope-of-deterrence-stability-in-south-asia/.

80 Khan, 'India-US Strategic Convergence', p.53.

Conclusion: Looking Ahead

The dialogue provided valuable insights into the perceptions of EDTs in South Asia, highlighting the complex and multifaceted role these technologies play in shaping regional security dynamics.

While EDTs carry substantial risks to regional stability, they also present opportunities for improving crisis management and prevention. A key takeaway from the dialogue was the role of distrust. This lens of strategic insecurity amplifies fears, deepens mutual suspicion, and complicates efforts to manage and prevent crises. Distrust not only shapes how each country interprets the other's technological advancements, but also limits the possibilities for India and Pakistan to realise the potentially cooperative benefits of EDTs in managing nuclear risks.

The dialogue also underscored the impact of technological disparities between India and Pakistan, driven in part by their respective strategic partnerships with global powers. These imbalances heighten security concerns, reinforcing the competitive cycle where each country views the other's advancements as direct threats to its national security. This dynamic creates an environment prone to misperceptions, heightening tensions and increasing the risk of escalation.

As both countries continue to modernise their military capabilities through the adoption of EDTs, there is a need for more robust crisis management mechanisms and communication strategies. Participants in earlier dialogues facilitated by BASIC have highlighted the need for more robust normative frameworks to mitigate these risks. For example, agreements like the 2005 Agreement on Pre-Notification of Flight Testing of Ballistic Missiles[81] could be expanded to include notifications of missile tests involving other advanced technologies, such as hypersonic cruise missiles.[82] Similarly, the 1988 Non-Attack Agreement could be broadened to include provisions for addressing deliberate cyber attacks on nuclear command and control systems and critical infrastructures by explicitly banning such cyber intrusions. To back up such an agreement, both countries should commit to notify each other of any suspected cyber threats, establishing clear protocols for immediate consultation and de-escalation in case of a cyber incident. The purpose of such a new joint mechanisms would be to address the offence-defence differentiation problem that cyber capabilities aimed at plugging a perceived gap in one's cyber defences can all too easily be used to offensively attack another a nuclear adversary's digital systems, including its vitally important nuclear C3I systems.[83]

The insights gained from the Manama dialogue lay the groundwork for the follow-on dialogue that BASIC will facilitate in Istanbul in early February 2025. This dialogue will focus on identifying pathways to manage the implications of EDTs in the region, with the aim of exploring best practices and responsible behaviours that can mitigate the risks associated with these technologies.

81 Agreement Between India and Pakistan on Pre-Notification of Flight Testing of Ballistic Missiles, signed 3 October 2005, https://www.mea.gov.in/portal/legaltreatiesdoc/pa05b0591.pdf.

82 See Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia,* p.27. See also Alice Spilman, Chiara Cervasio, and Eva-Nour Repussard, *Exploring Nuclear RIsk Reduction Pathways in Southern Asia through Nuclear Responsibilities* (BASIC-ICCS: London, 2023), pp.10-11, https://basicint.org/report-exploring-nuclear-risk-reduction-pathways-in-southern-asia/.

83 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia,* p.27.

Part C

Addressing Emerging Technology Risks for Crisis Prevention and Management in South Asia

Rabia Akhtar, Ruhee Neog, Hina Pandey, and Adil Sultan

Introduction

Parts A and B of the report have explored—from a quantitative and qualitative perspective—the risks that EDTs pose to crisis prevention and crisis management between India and Pakistan.

Part C of the report–written collaboratively by two Indian and Pakistani participants present (in their personal capacities) at both the Manama and Istanbul dialogues–focuses on the responsible practices and policy proposals that emerged from the Istanbul dialogue.

The first section of Part C highlights the asymmetries in risk perceptions and definitional controversies—some of which had already emerged in the Manama dialogue—that conditioned how Indian and Pakistani participants viewed the desirability and feasibility of the responsible practices/policy proposals discussed. The second section of Part C identifies three baskets of practices/proposals that emerged from the dialogue, which we consider particularly important for mitigating the risks posed by EDTs to crisis management and prevention in South Asia. We set out a range of responsible practices and policy proposals spanning the international, bilateral, and track 2/1.5 levels that were explored and debated at the dialogue. In doing so, we acknowledge that while in the present circumstances–and due to divergent approaches–the policy proposals and responsible practices are difficult to operationalise, they may attract the attention of policymakers in the future as they grapple with the challenges that EDTs pose to national, regional, and international security.[84]

84 *Disclaimer*: The views expressed in Part C represent the personal perspectives of the individual authors and do not necessarily reflect a unanimous consensus. While every effort has been made to arrive at a broadly agreed summary, variations in opinion may still exist amongst the contributors.

PART I.

Indian and Pakistani Risk Perceptions: Key Reflections from Istanbul

An analysis of the conversations between Indian and Pakistani participants at the Istanbul Dialogue reveal a series of key reflections.

These can be broadly classified into three categories: definitional or lexical ambiguity, asymmetric threat perceptions, and in some cases, a sense of shared risk. Without clarity on what constitutes 'EDTs' or consensus on Indian and Pakistani technological maturity, the three categories assume that there is no one objective 'reality' and perceptions shape threat assessments. They are explained in greater detail below.

Definitional ambiguity

EDTs, which are more commonly referred to as 'emerging technologies' across South Asia, lack conceptual clarity. One of the areas that lacks consensus and requires clarification is how 'EDTs' are understood in the region: whether these are existing technologies with new and evolving military applications, or new and 'emerging' technologies. Definitional fuzziness complicates efforts to establish common standards and new confidence-building measures (CBMs) to manage these technologies—at such a time as there may be political readiness to do so.

Asymmetric threats

The Istanbul Dialogue highlights the risks associated with the integration of EDTs in the military domain, as well as differing perceptions between Indian and Pakistani participants on this. Some participants considered that India viewed EDTs as opportunities to strengthen its military capabilities, particularly in areas such as ballistic missile defence (BMD) and anti-satellite weapons (ASAT). These technological advancements–from the Indian perspective–are considered vital to its national interest. Such technological developments raised concerns among Pakistani participants about the dangers of a growing imbalance between the two sides. In response to these Pakistani concerns, Indian participants emphasised that India's investment in these technologies has to be seen in the wider context of the threat that China's increasing technological advancements pose to India.

The divergent threat perceptions driving India and Pakistan's technological developments are exacerbated by the role of strategic partnerships—this was a subject that came up repeatedly in the Manama dialogue (see Part B). India perceives that Pakistan's strong and long-standing partnership with China will enable Pakistan to have access to EDTs that will significantly augment its military capabilities. However, the participants at the Istanbul dialogue suggested that Pakistan's access to technologies from China may be more limited than

widely assumed. If that is indeed the case, perceptions of strategic alignment—rather than actual transfers—are shaping regional threat assessments. For Pakistan, its deteriorating security environment vis-a-vis India is accentuated by the anxiety that the United States is furnishing India with access to highly advanced technologies.[85]

These divergences in perception give rise to what Repussard, in Part A of this report, terms the "maturity perception effect": the more mature a technology's integration or development, the greater the risk impact on crisis management and prevention. This view found wide concurrence among the participants. The Manama dialogue, in which we all participated, explored the extent to which the maturity perception effect is driven by what has been termed "peaceful/defensive self-images".[86] Each side assumes that its adversary understands its technological developments are not threatening, and therefore, rejects any claims to the contrary. Dialogue participants agreed that this creates a dynamic in which India views its technological potential as a stabilising force vis-a-vis Pakistan, while Pakistan perceives this same potential as destabilising–and vice-versa.

Shared risks

Participants recognised that a common set of risks—as well as opportunities—confront nuclear-armed states that are incorporating EDTs into their military infrastructure. This opened up a conversation as to whether EDTs present new opportunities for India and Pakistan to cooperate to manage shared risks.

One critical EDT that presents both shared risks and opportunities for cooperation is the integration of AI into nuclear decision making–especially in the realm of national Nuclear Command, Control, and Communications (NC3). A consensus emerged strongly at the dialogue about the danger of ever taking humans out of the loop of the NC3 system. It was agreed that without the critical element of human judgement, algorithms could all too easily exaggerate or misinterpret a threat, setting off a chain of consequences where there is no time for human intervention to bring a crisis under control.

Nevertheless, it was also recognised that AI could improve crisis decision-making by improving analytical capabilities in fast breaking—most likely cross-domain—high-stress situations. However, the potential dangers of human reliance on AI-generated recommendations was also discussed, notably that AI decision-making tools might recommend escalatory strategies to decision makers–either in the belief that their adversary is doing this or because the AI is seeking to win the crisis. Participants cautioned that such brinkmanship could all too easily lead to inadvertent–or even advertent nuclear use.

The use of AI in information warfare more generally was also identified as posing new risks to crisis management. Participants observed the potential for AI to be used for misinformation and disinformation, drawing on examples from the use of these technologies in Gaza and Ukraine. Deploying such tactics to manipulate the information environment can contribute to a war of narratives. This complicates both crisis management and prevention: misinformation and fake news perpetuate cycles of distrust that increase the likelihood of crises occurring, and if they do occur, make it much harder to find viable off-ramps.

85 For further analysis, please see: White House, 'Joint Fact Sheet: The United States and India Continue to Chart an Ambitious Course for the Initiative on Critical and Emerging Technology', 17 June 2024, https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2024/06/17/joint-fact-sheet-the-united-states-and-india-continue-to-chart-an-ambitious-course-for-the-initiative-on-critical-and-emerging-technology/; Hideki Tomoshige, 'The Strategic Convergence of the U.S.-India Innovation Partnership', *Center for Strategic & International Studies*, 22 December 2023, https://www.csis.org/blogs/perspectives-innovation/strategic-convergence-us-india-innovation-partnership-0; 'India and the US to partner for future technologies', Economist Intelligence, 14 February 2023, https://www.eiu.com/n/india-and-the-us-to-partner-for-future-technologies/.

86 Booth, and Wheeler, *The Security Dilemma*, pp.51-58.

> ***Participants recognised the benefits that increased cybersecurity offers in terms of protecting a state's critical infrastructure, particularly those that are integral to the nuclear enterprise.***

Nevertheless, one participant–returning to the survey findings in Part A–drew attention to how AI for information warfare is the one EDT where Indian and Pakistani survey respondents believe the other has a technological lead. If so, it was suggested that this could create a basis for an agreement on co-operative risk-reducing CBMs to mitigate the risks that this EDT poses to crisis management and prevention. The development of cyber capabilities also presents both challenges and opportunities. A shared risk perception that emerged during the dialogue, for example, was the vulnerability of NC3 to cyber threats. Participants recognised that even if an actor seeks to reassure its adversary that its cyber capabilities are only for defensive purposes, the inherent offence-defence ambiguity in cyber operations means that adversaries are not so easily reassured. However, participants also recognised the benefits that increased cybersecurity offers in terms of protecting a state's critical infrastructure, particularly those that are integral to the nuclear enterprise.

Participants agreed that as adversaries, India and Pakistan will necessarily differ in the risks they perceive from each other's integration of EDTs in the military domain. That said, these divergences also reveal certain shared concerns. Enabling EDTs to help, rather than undermine, crisis prevention and management will involve understanding these divergent—as well as convergent—risk perceptions.

The following sections examine the range of practices and policies discussed during the dialogue–progressing from international frameworks to bilateral engagements and, finally, to track 2/1.5 initiatives.

PART II.

Responsible Practices and Policy Proposals to Enhance Crisis Management and Prevention in South Asia

In this and the following sections, we examine how dialogue participants assessed the range of responsible practices and policy proposals aimed at ensuring that EDTs and their development do not exacerbate existing distrust or weaken current mechanisms of crisis prevention and management in South Asia, focusing on their rationale, desirability, and feasibility.

2.1 The International Level

Box 2: Proposals at International Level

- Governance Mechanisms for Emerging Technologies (Pact for the Future, UNSCR 1540 Model).
- Expand nuclear risk reduction dialogues to incorporate EDT-related concerns.
- Leverage multilateral platforms such as NAM, SCO, and TPNW to foster responsible state and non-state behavior concerning EDTs.

The Istanbul Dialogue produced fruitful conversations around the possibilities for managing the risks of EDTs at the international level. Participants explored a range of existing frameworks, mindful of geopolitical constraints and differing national priorities. Key proposals included: (i) adapting United Nations Security Council Resolution (UNSCR) 1540 to include regulation and monitoring of emerging technologies; (ii) expanding existing nuclear risk reduction dialogues to incorporate EDT-related concerns; and (iii) leveraging multilateral platforms such as the Non-Aligned Movement (NAM), the Shanghai Cooperation Organization (SCO), and the Treaty on the Prohibition of Nuclear Weapons (TPNW) to foster responsible state and non-state behaviour in this domain.

Governance Mechanisms for Emerging Technologies

Pact for the Future

On 22 September 2024, Heads of State and Heads of Government adopted at the United Nations "Pact for the Future".[87] This is a blueprint for transforming global governance, including provisions relating to peace and security. It committed governments to take steps that could avoid weaponization and misuse of new technologies, and affirmed that the laws of war should apply to these technologies.[88] The purpose being to incentivise states to engage with global and regional initiatives to enhance awareness and explore ideas for the regulation of EDTs, reducing the possibility of their misuse by state as well as non-state entities. Different levels of expertise at the state level and the rapid pace of development–led largely by private companies–in the field of emerging technologies make negotiating new international norms and agreeing national standards challenging. However, dialogue participants recognised that states have a responsibility to ensure that EDTs are not malevolently used by state or non-state entities. One potential model to limit the possibility of such nefarious uses is UNSCR 1540.

The UNSCR 1540 Model

The Resolution—adopted under Chapter VII of the UN Charter on 28 April 2004 and legally binding on all states—obligates states to strengthen their domestic laws and regulatory systems to prevent non-state actors from obtaining access to and proliferating Weapons of Mass Destruction (WMD) related materials and technologies.[89] The Security Council established the 1540 Committee[90] to monitor and oversee the implementation of Resolution 1540. UN Member-States are required to provide reports of their compliance and the Committee has the authority to propose measures to improve national legal and regulatory frameworks.

Dialogue participants were engaged by the idea of establishing a similar governance mechanism for EDTs. In particular, it was suggested that a mechanism could be devised on the basis of the 1540 Committee to regulate the activities of commercial entities and private individuals involved in the development of new technologies. However, a number of participants argued that such an initiative would have to be led by the five nuclear-armed Permanent Members of the UNSC (N5). The participants at the Istanbul meeting discussed this proposal, but there was no consensus between the Indian and Pakistani representatives on the feasibility of such an approach.

However, it was agreed by participants that an expansion of UNSCR 1540 to encompass EDTs would contribute importantly to reducing the risks that third party non-state actors might seek to use EDTs–for example, AI-generated deep fakes–to draw India and Pakistan into a process of inadvertent escalation.

Expand Nuclear Risk Reduction Dialogues to Incorporate EDT-related Concerns

Dialogue participants explored the possibility of the long-standing risk reduction dialogue between the N5 being extended to include India and Pakistan. This could be a forum where the nuclear risks emanating from EDTs could be discussed among seven of the nine nuclear possessor states. One important suggestion was that the N-5 + 2 could affirm their collective commitment to the principle - agreed by the United States and China in their declaration of 16 November 2024—that there must always be 'human control over the decision to use nuclear weapons'.[91]

87 United Nations Service Information Vienna, 'Pacts for the Future', September 2024, 'https://unis.unvienna.org/unis/en/topics/related/2024/pact-for-the-future.html.

88 United Nations, 'United Nations adopts ground-breaking Pact for the Future to transform global governance', 22 September 2024, https://www.un.org/sustainabledevelopment/blog/2024/09/press-release-sotf-2024/.

89 United Nations Office for Disarmament Affairs, 'UN Security Council Resolution 1540 (2024), https://disarmament.unoda.org/wmd/sc1540/.

90 United Nations, '1540 Committee', https://www.un.org/en/sc/1540/.

91 Ministry of Foreign Affairs, The People's Republic of China, 'President Xi Jinping Meets with U.S. President Joe Biden in Lima', 17 November 2024, https://www.mfa.gov.cn/eng/xw/zyxw/202411/t20241117_11527672.html.

Leverage Multilateral Platforms to Foster Responsible State and Non-State Behavior Concerning EDTs

Non-Aligned Movement Platform at the Conference on Disarmament

The Non-Aligned Movement (NAM) consists of a majority of Non-Nuclear Weapon States (NNWS) actively engaged in discussing disarmament related issues at the Conference on Disarmament (CD) in Geneva. This influential group–including India and Pakistan–could, it was suggested, launch a new initiative demanding assurances from all the nuclear armed states that they will not delegate launch authority to AI, maintaining human control over nuclear weapon decision-making at all times.

Expanding the SCO Security Agenda

The Shanghai Cooperation Organization (SCO) is another potential platform to discuss emerging technologies and its associated risks. One participant suggested that the SCO, being a non-western regional construct–and having the membership of both Russia and China–may appeal to India and Pakistan as a regional forum to engage this issue. Set against this, some participants suggested that emerging technologies do not form part of the Agenda of the SCO. Nevertheless, the SCO in 2023 held its first-ever Startup Forum with an aim to expand on the startup interactions amongst the SCO Member States to nurture the spirit of innovation. Given this, participants suggested that a conversation on 'sharing best practices' in the area of emerging technologies could be held amongst start-ups in the SCO format.

The TPNW Model

The Treaty on the Prohibition on Nuclear Weapons (TPNW) could be another model to build a norm against the misuse of emerging technologies for military purposes. This would require NGOs and like-minded states to build a coalition and launch an international campaign for the responsible use of new technologies. Such a coalition could be useful in building norms around responsible development and the use of new technologies to ensure that they are fully compliant with International Humanitarian Law (IHL). Some participants, however, felt that norm-setting via the TPNW would not be looked at favourably by India and Pakistan since neither participated in its negotiation. The two adversaries share the belief that the TPNW's provisions are not part of customary international law (a position shared by the N5).

2.2 Bilateral Responsible Practices and Policies

Box 3: Proposals at the Bilateral Level (India-Pakistan):

- Unilateral commitments by India and Pakistan to ensure human control over decision-making in AI-enabled warfare.
- Cyberwarfare CBM: Extend the 1988 India-Pakistan agreement to include commitments against using cyber weapons to degrade retaliatory nuclear capabilities, especially NC3 systems.
- Prohibit the deployment of fully autonomous weapons in South Asia, though there would be challenges related to sovereignty—and legal and ethical issues would need to be addressed.
- Hotlines and Crisis Communication Mechanisms: Improve crisis communications between India and Pakistan by integrating EDT discussions into existing hotlines or creating new mechanisms specifically for AI and cyber risks.
- Use the DGMO hotline to address EDT-related anxieties, especially concerning AI in nuclear decision-making.

Given the current state of India-Pakistan relations—CBMs on EDTs may seem unlikely. However, even minimal cooperation could contribute to reducing the risks of crisis escalation. Discussions at the bilateral level explored: (i) incorporating EDT-related assurances into existing agreements; (ii) updating existing CBMs to address cyber and space-based threats; and (iii) unilateral commitments to responsible AI use. While political and verification challenges persist, these proposals reflect a pragmatic approach to crisis prevention in South Asia.

India-Pakistan CBMs on EDTs: A Reset from Impossible to Probable

The current state of India-Pakistan relations can be described as being at its lowest point–marked by strategic stasis and a widespread public perception that relations between the two countries are unlikely to improve over the next decade. It is further evident that both countries' security realities and global interests remain different. For this reason, the rationale, necessity, and domestic drivers behind any CBMs would differ between the two countries. However, the sensitivities of CBMs remain integral to the maintenance of peace and stability, especially with regard to preventing crises from occurring and escalating. Bearing in mind the current realities of bilateral relations; while the potential for CBMs range from 'impossible to probable'; there is always merit in discussing these, as they present opportunities for innovative, constructive and positive policy interventions. Building on the hopes emanating from the lowest common denominator of India-Pakistan relations in the last five years: cricket (bilateral but non-governmental); SCO meeting (multilateral, regional — distant), and the DGMO (Director Generals of Military Operations) Joint Statement – 2021 (bilateral and promising) some suggestions can be made.

Unilateral commitments by India and Pakistan to ensure human control over decision-making in AI-enabled warfare

Beyond international practices to regulate EDTs, participants explored the possibilities for India and Pakistan to develop new mechanisms and transparency measures to manage and reduce the nuclear risks posed by EDTs. Participants discussed the possibility that in the absence of agreement among the N5, India and Pakistan could make a unilateral commitment to keep a human in the decision-making loop for NC3 and AI-enabled warfare. Such a declaration would promote the (evolving) global norm of *responsible deployment of AI* and AI's integration into military strategies. We noted above that India and Pakistan might make such a commitment as part of a P5 + 2 process, but unilateral acts of this kind could be made independent of this. Unilateral declarations would be a step forward in norm-setting in the emerging (technologies) nuclear order. Whatever the benefits of such unilateral declarations, some participants considered that such efforts were not politically viable in the current global geopolitical environment—unless the initiative was first taken by the N5.

Extend the 1988 India-Pakistan Agreement to Include Commitments Against Using Cyber Weapons

The other key area where participants considered that a CBM was urgently needed to manage new weapons innovations was in the domain of cyberwarfare. What was required, it was suggested, was bilateral assurances that cyber weapons would not be employed to degrade an adversary's retaliatory capability–crucially, by attacking its NC3. Some participants expressed the need to update and expand the spirit of existing agreements, specifically the 1988 "India-Pakistan Agreement on the 'Prohibition of Attack against Nuclear Installations and Facilities", (hereafter NAA)[92]. The NAA is the oldest CBM between India and Pakistan,

92 Agreement on the Prohibition of Attack Against Nuclear Installations and Facilities between India and Pakistan', 31 December 1988, https://www.mea.gov.in/Portal/LegalTreatiesDoc/PAB1232.pdf.

and is widely viewed on both sides as a highly successful one.[93] It was suggested that the NAA could be extended to include commitments to not use cyber weapons against NC3 and related space-based assets. However, some participants emphasised that a ban on attacks against space-based assets and NC3 might be exceptionally difficult to achieve in the current political context. Nevertheless, it was recognised that, regardless of its current feasibility, it is desirable to explore how this could be pursued should political conditions evolve to enable the upgrading of existing CBMs.

One criticism of the NAA concerns the challenge of verifying that all military-related nuclear facilities are being declared.[94] Verification was raised as a challenge in extending the 1988 Agreement to encompass a ban on cyber attacks against NC3 and space-based assets. Such an agreement might offer some reassurance–if it could be achieved politically–but Indian and Pakistani decision-makers, imbued with a mindset of distrust (see Part B of the report), would worry whether it could be relied upon in times of intense crisis.

In addition to extending the NAA to encompass cyber attacks, participants suggested that the NAA could also be expanded to include attacks against critical facilities such as Information Communication Technologies Centers (ICTs)/ Data Centers of national importance. In the context of the use of sabotage against civilian nuclear facilities for tactical military advantage—as evident in the Ukraine War—participants emphasised the importance and practical utility of expanding the NAA to include attacks against these critical facilities.

Prohibit the Deployment of Fully Autonomous Weapons in South Asia

A further area suggested by participants to reduce the risks that EDTs pose to crisis management and prevention is a bilateral/regional agreement prohibiting the deployment of fully autonomous weapons in South Asia. Participants accepted the desirability of restraints on these weapon systems, but also identified three key obstacles to achieving this. First, the existence of contested areas in the geographies of India-Pakistan and India-Pakistan-China relations will inevitably invite discussions about the scope of weapon deployments and their impact on questions of sovereignty. Second, the current conversation surrounding LAWS (Lethal Autonomous Weapon Systems) at the GGE has made limited progress because of divergent views in relation to definitional, legal, and ethical issues. The same challenges present themselves in relation to agreeing on a shared regulatory framework at the bilateral level–and even more so if it becomes a trilateral process. A bilateral or regional initiative would become increasingly necessary if the GGE on LAWS fails to make meaningful progress.

Hotlines and Crisis Communication Mechanisms

There was strong advocacy for improving crisis communications between India and Pakistan. Some suggested integrating EDT discussions into existing hotlines or creating a separate mechanism to specifically address AI and cyber risks. In 2021, the DGMO of India and Pakistan issued a Joint Statement agreeing to observe the 2003 Ceasefire Agreement along the Line of Control (LoC)[95]. Participants suggested that the DGMO hotline could be used as a mechanism to discuss anxieties arising from the incorporation of EDTs into military postures and strategies.

93 As of 2025, 34 uninterrupted exchanges have taken place between the two countries; further, situated in the context of the potential use of sabotaging civilian nuclear facilities for tactical military advantage as demonstrated in the Ukraine crisis; the importance and practical utility of expanding the NAA stands out. See Ministry of External Affairs, Government of India, 'India and Pakistan exchange list of Nuclear Installations', 1 January 2025, https://www.mea.gov.in/press-releases.htm?dtl/38877/India_and_Pakistan_exchange_list_of_Nuclear_Installations. See also Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*, p.27.

94 Toby Dalton, 'Modernize the South Asia Nuclear Facility "Non-Attack" Agreement', *Stimson Center*, 28 June 2017, https://carnegieendowment.org/posts/2017/06/modernize-the-south-asia-nuclear-facility-non-attack-agreement?lang=en; Rabia Ahktar, and Ruhee Neog, *Through the Sands and Time: The Enduring Legacy of the India-Pakistan Non-Attack Agreement* (RUSI and the Stanley Center for Peace and Security, 2024), https://stanleycenter.org/publications/india-pakistan-non-attack-agreement/.

95 Joint Statement on the India-Pakistan Line of Control, 25 February 2021, https://pib.gov.in/PressReleasePage.aspx?PRID=1700682.

One particular concern is whether existing crisis communication mechanisms are sufficient to manage the challenge posed by the incorporation of AI into nuclear decision making. Participants recognised that even if India and Pakistan were to agree on a declaration similar to the US-China one of November 2024, it would not eliminate the risks and dangers posed by greater reliance on AI decision support systems in the military space (see Part A and B of this report for a more detailed discussion of these risks). Participants discussed the lessons from the Ukraine war which has highlighted how EDTs–particularly AI and cyber capabilities–can shape the contours of modern conflict through information warfare and battlefield disruptions. It raises important questions about whether similar AI-enabled escalation risks from hypersonic missiles and MIRVs could arise in future India-Pakistan crises. As both countries modernize their arsenals, maintaining crisis stability will become even more challenging, necessitating innovative mechanisms for risk reduction. Participants identified several potential tools to manage these risks. These included the establishment of a Cyber-Nuclear Hotline for real-time threat clarification and the creation of a India-Pakistan AI and Misinformation Working Group at the track 1 level to manage the destabilising effects of emerging technologies in future crises.

2.3 Initiatives at the Track 2/1.5 Level

Box 4: Initiatives at the Track 2/1.5 level:

- Track 2/1.5 India-Pakistan Joint Working Group on EDTs: Establish a working group, consisting of technical experts and policy-makers from India and Pakistan, focused solely on EDTs.
- Bilateral track 2 Engagement through Think Tank Exchanges: Foster sustained, informal dialogues between Indian and Pakistani think tanks, involving direct partnerships and collaborative research projects.
- Private-Public Collaboration at the National Level. Establish stronger partnerships between the public and private sectors in both India and Pakistan to manage EDT-related risks.
- Regular track 2/1.5 Dialogue on EDT Risks. Regular, structured dialogues on the potential risks of EDTs, including unintended escalation in military contexts, particularly nuclear crises.

With track 1 dialogues between India and Pakistan frozen, participants explored whether there are mechanisms that might be developed at the track 2/1.5 level that could galvanise track 1 diplomatic interactions. It was recognised that such initiatives must involve collaboration between civil society, think tanks, and the private sector to address the disruptive potential of emerging technologies in South Asia. These are informal—yet impactful channels—that can foster candid exchanges, build mutual understanding, and shape forward-looking strategies that can support crisis prevention and management between India and Pakistan.

The Track 2/1.5 India-Pakistan Joint Working Group on EDTs

Dialogue participants in Istanbul proposed the creation of a track 2/1.5 *Joint Working Group* (JWG) with the sole objective of discussing EDTs. The proposed initiative, involving technical experts and policy-makers from both countries, would provide a structured forum to: (i) discuss the nature of EDTs, including their evolving definitions, dual-use characteristics, and varying levels of maturity across AI, cyber, space-based, and autonomous weapons systems, all of which shape differing perceptions of threat and opportunity for the two

There was also a growing recognition among participants of the importance of promoting sustained dialogue between the think-tank community from both sides assisted by third parties.

countries; (ii) a proactive, forward looking regional strategy to manage their emergence in the India-Pakistan security context; and (iii) reduce the risk of misperceptions in relation to both sides' incorporation of EDT's into their military–especially nuclear strategies. A possible model for such a mechanism is the Standing Consultative Commission (SCC). Established between the United States and the Soviet Union under the SALT I agreements, the SCC was a joint institution tasked with clarifying, refining, and sustaining arms control agreements by handling compliance related issues and allowing for early corrective action.[96] Given the rapid evolution of technological advancements and their implications for South Asian strategic stability, this working group could serve as an important mechanism for increasing transparency, reducing distrust, and potentially developing new trusting relationships that might spillover into the track 1 level. This platform would enhance transparency regarding the use of emerging technologies and cultivate mutual understanding by fostering regular, technically informed dialogues and joint problem-solving. By cultivating pre-established lines of communication and fostering trust-building relationships, the JWG could play a crucial role in defusing misperceptions, reducing the risk of inadvertent escalation, and providing off-ramps before a crisis spirals out of control.

Bilateral Track 2 Engagement through Think Tank Exchanges

There was also a growing recognition among participants of the importance of promoting sustained dialogue between the think-tank community from both sides assisted by third parties. While third-party think-tanks have played a facilitating role in fostering exchanges between Indian and Pakistan experts, bilateral engagement could be initiated through direct institutional partnerships and co-authored and collaborative research projects. Regular virtual discussions involving nextgen policy scholars from both sides, and expert virtual roundtables could provide alternative avenues for sustained dialogue in the absence of formal third-party platforms. Additionally, regional and global forums focusing on technological governance and security where EDTs are discussed could serve as spaces for informal interactions.

The interaction between experts and analysts could serve to increase understanding about EDTs, their uses, and the security risks they present. Such discussions could also help identify potential new escalation pathways emanating from the employment of EDTs in the region and help explore ways to mitigate those risks where technology has the potential to become a source of geopolitical instability. India-Pakistan think-tank-led dialogues could not only contribute to thought leadership in South Asia on EDTs but also help track 1.5 engagements (whenever they take place) by offering independent, well-researched perspectives.

96 Robert W. Buchheim, and Dan Caldwell, 'The U.S.-USSR Standing Consultative Commission: Description and Appraisal' in Paul Viotti (ed), *Conflict and Arms Control: An Uncertain Agenda* (New York: Routledge, 2019).

Private-Public Collaboration at the National Level

The autonomous role of private technology firms is becoming an ever more prominent feature of the EDT landscape. It was recognised by participants that there was a growing requirement for increased public-private cooperation within India and Pakistan. The necessity of establishing regular dialogue between policymakers and industry leaders to develop sound regulatory frameworks that are both feasible and necessary was widely recognised. These engagements could ensure that private sector actors—who are the primary drivers of change—are also part of the discussion on how to handle technology responsibly and mitigate risks emanating from their use. Collaboration between governments and the private sector, participants felt, would create a balanced framework that would promote innovation. This would contribute to policymaking that addresses security and ethical concerns associated with disruptive technologies. It can be the next direction for the nuclear responsibilities approach and framework linking 'responsible' technology use with crisis mitigation efforts.

While these proposals offer promising avenues for enhancing dialogue, reducing distrust, and potentially building trust between India and Pakistan, their feasibility depends on sustained commitment from both states. Establishing a track 1.5—or less ambitiously—track 2 joint working group on EDTs will require political buy-in and crucially institutional support. It requires a willingness to depoliticise technology-related discussions in favor of crisis management and prevention goals that are shared by both sides.

Moreover, fostering public-private partnerships in India and Pakistan is challenging, as it requires regulatory coordination and trust-building between the two governments, their publics, and their private sectors. If implemented effectively, such initiatives could serve as CBMs, reinforcing mutual restraint and reducing the risk of crisis escalation as EDTs come into play. As highlighted in the 2024 BASIC report on crisis prevention and management,[97] mutual confidence in each side's ability to exercise restraint and exhibit rationality has historically played a critical role in managing India-Pakistan crises under the nuclear overhang. By embedding dialogue on EDTs within this broader framework, these proposals can contribute to an evolving responsibility-based approach to crisis prevention and management in South Asia.

Conclusion

The Istanbul Dialogue was a critical platform for examining the challenges and opportunities posed by EDTs to crisis prevention and crisis management between India and Pakistan.

The discussions underscored that while both states realize the transformative impact of EDTs, their perceptions are shaped by strategic asymmetries. India sees these technologies as force multipliers that enhance its security posture, while Pakistan sees them as worsening existing vulnerabilities. This divergence is further complicated by external strategic partnerships. The absence of a shared definition of EDTs in the region has also hindered establishing common regulatory norms, which makes it difficult to design CBMs that might alleviate some of the risks posed by these technologies.

Despite these differences, the Istanbul dialogue also revealed convergence on the need to address risks related to the integration of AI into nuclear command, control, and communication systems, cyber vulnerabilities,

97 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*.

and the weaponization of EDTs in information warfare. The dialogue revealed that, despite being traditional adversaries, India and Pakistan share common risks posed by technological disruptions. The role of AI in improving or jeopardizing crisis communication mechanisms, cyber threats to NC3 systems, and the growing use of EDTs in wartime narrative construction, all require a re-examination of current security approaches.

The Istanbul dialogue emphasised the importance of consistent and sustained engagement on EDTs at both bilateral and multilateral levels. Global initiatives–including the UN's Pact for the Future and extending UNSCR1540–and regional initiatives such as the Shanghai Cooperation Organization are potential forums for discussing EDTs without the political connotations that usually complicate bilateral relations. However, even if these organisations can promote new norms for regulation and management, these will always have to be grafted onto a South Asian security dynamic that is shaped by powerfully ingrained mindsets of distrust.

Although arms control as traditionally practiced is non-existent between India and Pakistan, the concept of arms control—predicated on adversaries sharing a common interest in restraint–has a key role to play in managing the risks posed by EDTs. One critical recommendation–building on the successful precedent of the 1988 NAA–would be to develop a new set of norms and principles to manage cyber and space-based threats to both sides' NC3. Track 1.5 and track 2 processes–including a new joint working group on EDTs, collaborative think tank activities, and public-private conversations between tech communities—can contribute to sustaining a "culture of restraint" (the language used by one participant at the earlier Manama dialogue) between the two adversaries.

The Istanbul Dialogue confirmed that the integration of EDTs into the South Asian strategic environment is imminent. But India and Pakistan have important agency in how far this is a source of future crises between the two countries or an opportunity to enhance existing–albeit increasingly fragile–restraints on the use of force - including nuclear force.

The policy proposals and responsible practices we have set out here have an important contribution to make to reducing the dynamics of distrust detailed in Part B of this report. They hold out the promise of promoting a shared conception of security to meet the shared risks and dangers that EDTs pose to crisis management and prevention in South Asia. The focus needs to change–EDTs should be seen as potential cooperative tools to mitigate risk, rather than as competitive tools that may lead to new vulnerabilities in an already sensitive security system.

Conclusion

Nicholas J. Wheeler and Eva-Nour Repussard

Managing EDT risks between India and Pakistan is not merely a technical challenge; it is fundamentally a cognitive one.

The central finding of this report is that both states interpret technological innovations and new weapons development through the prism of the deep distrust that defines their relationship. The policy proposals and responsible practices outlined in this report are aimed at reducing this distrust, lowering the likelihood of crises occurring, and minimising the risks of escalation if they do.

The report has identified two key drivers of distrust in India-Pakistan interactions: "peaceful/defensive self-images" and "bad faith models" of the adversary produced by enemy images. However, these dynamics of distrust are exacerbated by the role of strategic partnerships, as each side fears the other might gain a decisive strategic advantage through third-party technology transfers. As our dialogues revealed, Pakistani fears regarding the United States are mirrored by Indian concerns that China could provide Pakistan with access to its highly sophisticated suite of EDTs. This evolving security environment underscores the importance of the interconnected strategic dynamics between India, Pakistan, China and the United States—which fuels anxieties, and heightens the risk of crisis escalation.

Strategic stability in the India-Pakistan dyad has been seen to rest on a core condition of mutual vulnerability in which neither side can take their cities out of hostage.[98] The fears surrounding EDTs and their development in South Asia, is that one side might gain a lasting strategic advantage over the other, enabling it to escape its security dependence. This has profound implications for both crisis prevention and management.

In terms of crisis prevention, participants in both dialogues—especially Pakistani ones thinking of India—expressed concern that one or both sides might come to believe they have secured "escalation dominance".[99] This could embolden one side to take actions that challenge the other's red lines, potentially propelling the two states into another nuclear crisis.

If another India-Pakistan crisis occurs, this report provides strong reasons for worrying that the advent of EDTs will not only complicate crisis management but also create new pathways to escalation. For some Pakistani participants, India–emboldened by what they perceive as its technological edge–might believe that Pakistan would back down in a future crisis. Miscalculations of each other's resolve could trigger a "competition in risk taking",[100] potentially spiraling into escalating levels of violence. Indian and Pakistani participants agreed that a future crisis involving EDTs would pose a formidable challenge to crisis managers,

98 Thomas Schelling, writing in the Cold War context, explained this condition of mutual vulnerability as a mutual hostage relationship (see Thomas Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960), see also Schelling, *Arms and Influence*). This conception of deterrence and strategic stability is the guiding thesis of Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca: Cornell University Press, 1989).

99 The US nuclear strategist Herman Kahn coined the term in *On Escalation: Metaphors and Scenarios* (London: Pall Mall Press: 1965). Khan defined it as "a function of where one is on an escalation ladder [another concept coined by Kahn]. It depends on the net effect of the competing capabilities on the rung being occupied, the estimate by each side of what would happen if the confrontation moved to other rungs, and the means each side has to shift the confrontation to these other rungs. One variable affecting escalation dominance is each side's relative fear of eruption. That side, which has least to lose by eruption, or fears eruption the least, will automatically have an element of escalation dominance" (Khan, *On Escalation*, p.290).

100 Schelling, *Arms and Influence*, p.91.

who would be forced to contend with multi-domain interactions involving cyber, AI, hypersonics, ASAT, and BMD systems. The shared fear that deterrent capabilities could be neutralised would generate exactly the kind of preemptive anxieties that Schelling warned against.[101]

The policy proposals and responsible practices outlined in Part C by Akhtar, Neog, Pandey, and Sultan aim to avoid these pre-emptive anxieties by charting a course that helps prevent future crises. They begin by exploring what can be achieved at the international level, which was a prominent focus of the Istanbul dialogue. In identifying some creative–perhaps even "out-of-the-box"–ideas around the UNSC, NAM, and SCO, they recognise that any major and sustained progress will ultimately depend on the extent to which the N5 can forge a common consensus on the need to regulate EDTs. But given the deep distrust that currently prevails among the Western and non-Western members of the N5, it is hard to see the N5 taking a leadership role here. Akhtar et al. recognise the limits of what can be achieved at the international level in galvanising a new regulatory architecture for EDTs, leading them to explore the possibility of India and Pakistan developing a bilateral security framework to address the shared risks posed by these technologies.

The authors in Part C suggest that this framework could have four key planks, though they caution that realising any of these would require a significant improvement in India-Pakistan relations. The first is for India and Pakistan to issue unilateral declarations–or, even better, a bilaterally agreed statement-that they will always maintain a "human in the loop" in their NC3 systems. Second, an extension of the 1988 Non-Attack Agreement to prohibit cyber attacks against each side's NC3 systems and related space-based assets. Third, establishing at the track 2/1.5 level a Joint Working Group (JWG) on EDTs that would have a key role to play in reducing misunderstanding and suspicion around the development of EDTS, and could provide a vital channel of reassurance diplomacy. As Akhtar et al. point out, a precedent for this is the Standing Consultative Commission in the SALT process.

In our 2024 report on Crisis Prevention and Management in South Asia, we proposed establishing a track 2 South Asia Standing Communication Secretariat (SASCS).[102] The track 2/1.5 JWG on EDTs could nest within this wider body, providing key linkages to the track 1 level. In particular, the JWG could be tasked with exploring how EDTs can be used to promote mutual security between India and Pakistan. The report rightly emphasises the risk that AI could create new pathways to escalation, but future work should also explore how India and Pakistan might jointly develop AI tools to support de-escalatory policies and practices.[103]

The fourth component of a new bilateral framework for managing the risks of EDTs is integrating EDT discussions into existing hotlines or creating new communication mechanisms at the track 1 level specifically for AI and cyber risks. Akhtar et al. propose that the DGMO hotline could be used to address any EDT-related anxieties, especially concerning the role of AI in nuclear decision-making. BASIC's 2023 report on Crisis Communications between India and Pakistan identified two major obstacles to the effective use of hotlines in an environment of deep distrust–obstacles equally relevant to mitigating EDT-related risks.[104] The first is the concern that a hotline might be used for deceptive purposes. The second is the risk that, in a crisis, adversaries may hesitate or avoid using hotlines, fearing that their intent could be misinterpreted or that they might be perceived as lacking in resolve.

The distrust documented in this report underscores how difficult it will be for India and Pakistan to develop new CBMs in such an environment. As Akhtar et al. point out, arms control as a mechanism of reassurance is non-existent between the two adversaries. The best way forward as outlined in Part C lies in establishing new,

101 Schelling, 'Confidence in Crisis'.

102 Cervasio, Wheeler, and McClafferty, *Crisis Prevention and Management in South Asia*, p.23.

103 BASIC is committed to pursuing research in this space. For a theoretical exploration of how AI might promote empathy and trust in crisis situations, see Marcus Holmes, and Nicholas J. Wheeler, 'The role of artificial intelligence in nuclear crisis decision making: a complement, not a substitute', *Australian Journal of International Affairs* 78(2) (2024): 164-174, https://doi.org/10.1080/10357718.2024.2333814.

104 Rabia Akhtar, Chaira Cervasio, Ruhee Neog, Alice Spilman, and Nicholas J. Wheeler, *Crisis Communication: Indian and Pakistani Perspectives on Responsible Practices* (BASIC-ICCS, 2023), ,https://basicint.org/compendium-crisis-communications-indian-and-pakistani-perspectives/.

> ***EDTs are still at a preliminary stage of development in South Asia, and India and Pakistan possess important agency in determining the extent to which restraint and responsibility will shape their responses to these emerging technologies. This report constitutes an important step in that direction.***

mutually agreed norms of behaviour–grounded in restraint and responsibility–for the management of EDTs, with the aim of reducing nuclear risks. A behaviour-based approach to arms restraint of this kind lies at the heart of BASIC's Nuclear Responsibilities Approach. Central to this is the idea that India and Pakistan have to recognise that the only security in the nuclear age is common or mutual security. Recognition of this kind is the first step in breaking out of the mindsets that drive distrust.

It requires decision makers on both sides to exercise what has been called "security dilemma sensibility" (SDS),[105] an appreciation that an adversary might be acting out of fear and insecurity, and not predatory intent. The complex entanglements and interactions created by the "Nuclear Tetraplex" complicate the exercise of SDS. For example, even if Indian decisionmakers could loosen their deeply ingrained "peaceful/defensive self-image" and appreciate the fear of their Pakistani counterparts, they would face the difficulty of how to increase Pakistan's sense of security without exposing them to a potentially increased Chinese military threat.

Nevertheless, the cultivation of SDS by Indian and Pakistani leaders, officials, and diplomats holds out the promise that both sides will recognise in the advent of military EDTs a set of shared risks that demand shared responses. The implication of this for crisis management and prevention is that, rather than seeing crises as zero-sum tests of will, they can be reframed as critical moments of cooperation in disaster avoidance.[106]

We opened this report with Bull's recognition at the height of the Cold War of the problem of "continuous technological innovation". Bull saw no lasting escape from this problem–and this Report recognises that such a verdict remains a realistic one over six decades later. Yet EDTs are still at a preliminary stage of development in South Asia, and India and Pakistan possess important agency in determining the extent to which restraint and responsibility will shape their responses to these emerging technologies. This report constitutes an important step in that direction.

105 Booth, and Wheeler, *The Security Dilemma*, p.7.

106 This idea of the duality of crises is explored well in Phil Williams, *Crisis Management: Confrontation and Diplomacy in the Nuclear Age* (New York: Halsted Press, John Wiley, 1976). See also Glenn Herald Snyder, and Paul Diesing, *Conflict Among Nations: Bargaining, Decision Making, and System Structure in International Crises* (Princeton, NJ: Princeton University Press, 1977).

ANNEX 1

List of Survey Questions

1	To what extent do you think this technology / or development of this technology could provoke or deter an adversary from initiating an attack?
2	To what extent do you think this technology / or development of this technology can exacerbate or reduce misperceptions between conflicting parties, leading to a crisis?
3	To what extent do you think this technology can erode or strengthen nuclear command, control, and communications (NC3)?
4	To what extent do you think this technology can erode or strengthen existing channels of communication in a crisis?
5	To what extent do you think this technology can exacerbate or reduce misperceptions between conflicting parties during a crisis?
6	To what extent do you think this technology can reduce or increase decision-making time during a crisis?
7	How advanced do you think the development of this technology is in India?
8	How advanced do you think the development of this technology is in Pakistan?
9	Do you think there are any financial, legal, political or structural barriers preventing this technology from developing in India?
10	Do you think there are any financial, legal, political or structural barriers preventing this technology from developing in Pakistan?

ANNEX 2

EDTs Definitions Given to Participants of the Survey

Technologies	Definition
AI for C4ISR	AI for C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance) refers to the application of artificial intelligence technologies to enhance the capabilities and efficiency of C4ISR systems. By integrating AI, these systems can achieve improved data processing, decision making, and operational effectiveness.
AI for information warfare	AI for information warfare refers to the use of AI technologies in the context of influencing information or perceptions in conflicts or strategic situations. This includes various methods such as automated campaigns that disseminate information widely across social media to shape public opinion or impact perceptions, utilising techniques like deep fakes, data mining, etc.
AI for weapons and effects	AI for weapons and effects involves integrating artificial intelligence technologies to enhance the capabilities, precision, and effectiveness of various weapons systems. By leveraging AI, these systems can achieve advanced targeting, decision-making, and autonomous operation, significantly increasing their operational efficiency and impact. This notably includes unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), coordinated drone swarms, missile defence systems, and AI-powered naval operations.
AI for cyber operations	AI for cyber operations involves the use of artificial intelligence technologies to enhance cyber capabilities through advanced capabilities in threat detection, intrusion prevention, vulnerability assessment, incident response, and cyber attack execution.
Quantum for C4ISR	Quantum for C4ISR refers to the integration of quantum technologies within Command, Control, Communication, Computers, Intelligence, Surveillance, and Reconnaissance systems. These technologies harness principles of quantum mechanics to enhance capabilities in secure communication, precise sensing, efficient computing, and improved detection and navigation systems, thereby having the potential to strengthen military and intelligence operations.

Technologies	Definition
Multiple independently targeted re-entry vehicle (MIRV)	Multiple independently targeted re-entry vehicle (MIRV) is an exoatmospheric ballistic missile payload that carries several warheads, each capable of being independently aimed to hit different targets. This capability enhances the missile's effectiveness by allowing it to strike multiple targets simultaneously or saturate missile defences.
Hypersonic cruise missiles	Hypersonic cruise missiles are advanced weapons that combine the speed of hypersonic flight (exceeding Mach 5) with the manoeuvrability of cruise missiles. They are designed to travel at extremely high speeds while maintaining the ability to change trajectory and altitude, making them difficult to detect and intercept. Hypersonic cruise missiles are considered strategic assets due to their speed, manoeuvrability, and ability to penetrate advanced defence systems. Their development, acquisition and stockpiling are a focus for many nations seeking to enhance their military capabilities.
Ballistic Missile Defence (BMD)	Ballistic Missile Defence (BMD) Systems are advanced technologies and strategies designed to detect, track, intercept, and destroy incoming ballistic missiles before they can reach their intended targets. They involve a complex integration of radar, command and control, and interceptor technologies, and operate across various phases of a missile's flight. These systems aim to protect against the threats posed by ballistic missiles, which can carry conventional as well as nuclear warheads. Whilst BMD systems were primarily designed for ballistic missiles, some modern BMD systems are also equipped to detect and track cruise missiles.
Direct Energy Weapons (DEWs)	Direct Energy Weapons (DEWs) emit highly focused energy in the form of lasers, microwaves, or particle beams. Unlike conventional weapons that rely on the kinetic energy projectiles (such as bullets and missiles), DEWs use directed energy to disable or destroy their targets. Examples of DEWS include high-energy lasers (which use focused laser beams to burn through or disable targets, such as missiles, drones, or electronics) or high-power microwave weapons (which emit electromagnetic energy to disable electronic systems, e.g. communication networks, computer systems, or other sensitive electronics).
Non-kinetic anti-satellite (ASAT) capabilities	Non-kinetic anti-satellite (ASAT) capabilities refer to methods of disabling or disrupting satellites without physically destroying them. These capabilities focus on electronic, cyber, or other non-destructive means to achieve strategic objectives. Some examples of non-kinetic anti-satellite capabilities include signal jamming (which involves emitting radio satellite communications or navigation systems, disrupting their operations) or spoofing (which involves manipulating signals or data to mislead recipients or systems into believing false information).
Kinetic anti-satellite (ASAT)	Kinetic anti-satellite (ASAT) capabilities refer to methods and technologies designed to physically destroy satellites or render them inoperable through direct impact. Examples of kinetic ASAT capabilities include direct-ascent missiles (which are launched from the ground to intercept and collide with satellites in orbit), co-orbital kinetic kill vehicles (which involves deploying satellite or spacecraft into orbit with the purpose of manoeuvring close to a target satellite and physically destroying it), and space mines or debris (which involves deploying small objects or debris into orbits where they can pose a collision risk to enemy satellites).

BASIC promotes meaningful dialogue amongst governments and experts in order to build international trust, reduce nuclear risks, and advance disarmament.

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