vest in other satellite access technologies, such as the INMARSAT Mini M connection to access the Fiber Optical Link Around the Globe (FLAG) system, as well as to continue to provide key intercountry satellite connections through INTELSAT, access to submarine cable systems and the international maritime network through INMARSAT, and satellite-based paging services. These channels will supplement the domestic satellite communications services already provided by the INSAT system to commercial, military, and national leadership users.

Most important from the perspective of defense and strategic communications, however, is India’s new and growing interest in VSAT communications systems. The terminals associated with these systems are relatively small in size, are vehicle portable, and, unlike fiber-optic and cable technologies, operate independently of distance; thus, they can serve as ready-made infrastructure in places where trunk lines of different sorts prove too costly or impractical. Since relatively secure satellites in geosynchronous (GEO) orbits serve as the backbone for VSAT networks, VSAT terminals can call on any available GEO satellite, passing signals when necessary in a bent-pipe configuration from one earth station to another and sometimes from satellite to satellite to establish a secure, reliable link with another VSAT terminal. Given the advantages of this system, India has begun to invest heavily in VSAT networks for both commercial and strategic uses, opening the Ku band in addition to the C band previously available for VSAT users. In fact, it is likely that all of India’s strategic institutions, including the nuclear and defense research and development establishments as well as the uniformed military, will settle—as more and more satellite transponder space becomes available—on VSAT technologies for their long-distance, beyond-line-of-sight communication requirements, especially when reliability, portable equipment, jam resistance, and security are necessary for their success.

348 For details, see “India: The Commercial and Regulatory Environment.”
When these multiple layers of infrastructure modernization are completed, the civilian communications network will give Indian decisionmakers a host of technologies with which to access their strategic enclaves and nuclear delivery assets in an emergency. The advantage New Delhi enjoys here is that its nuclear doctrine does not require rapid retaliation, and India can thus afford to delay its response in the face of significant damage to its communications systems. Therefore it is unlikely to be handicapped by waiting for the reconstitution of its transmission links, however partial, before it unleashes retribution.

There are at least four different types of communications systems available to New Delhi for this purpose. At the first level, connectivity can be established simply through landlines. While these are no doubt vulnerable because many critical components of the circuit-switched network are above ground, and because it will be some time before India develops a completely packet-switched voice and data network, neither Beijing nor Islamabad can be certain that New Delhi will be unable to use this system without expending an even larger number of weapons than they might otherwise allocate to the counter-C3I mission.352 Since the number of weapons that either state can allocate to such a mission is small to begin with, it is possible that at least some landline connections that survive the initial attack will enable Indian decisionmakers to establish contact with their strategic components for purposes of ordering retaliation. Neither Pakistan nor China is known to emphasize the counter-C3I mission in their strategic targeting—and even if this changes with respect to China over time, it is unlikely that Beijing would be willing to expend a large number of warheads for such a mission given the competing demands that its relatively small strategic forces already face vis-à-vis other adversaries.353 In any event, if India develops a completely packet-switched system over time, the damage that can

352 The difference between standard circuit switching and packet switching was first described by Paul Baran at RAND in 1961, and his work is usefully summarized in Wohlstetter and Brody, "Continuing Control as a Requirement for Deterrence," pp. 169-178. India’s packet-switched capabilities are described in “India—The Commercial and Regulatory Environment” and in India—Fixed Network: Voice and Data Services (Bucketty. Australia: Paul Budde Communication, 2000), pp. 1–7.

353 These demands are discussed in some detail in Gill and Mulvenon, “The Chinese Strategic Rocket Forces: Transition to Credible Deterrence,” pp. 11–57.
be caused even by larger hypothesized Chinese attacks to its landline network would be circumvented, at least as far as issuing launch orders and receiving confirmation of receipt are concerned.\textsuperscript{354}

In any event, there is a second communications system already in place. Should all landlines be rendered inoperable—a remote prospect to begin with—Indian decisionmakers could use other kinds of wireless transmissions, such as high-frequency (HF) broadcasting systems, to issue their launch orders. HF broadcasts, especially in the sky-wave propagation mode, can be received by receivers beyond the horizon up to many thousands of kilometers away and, as one analysis has pointed out, "have overcome [many of their] reliability problems in recent years."\textsuperscript{355} The advantage of HF transmitters is that they are relatively small, can be made mobile, and suffice even at low power. The disadvantage of HF communications is that they can be interrupted or degraded by weather conditions, nuclear weapon effects, and jamming by hostile adversaries. Such degradation, however, is usually transient and, as such, would not eliminate the connectivity between the leadership and its strategic elements either if multiple transmitters exist or if the national command authority, being committed to a strategy of delayed retaliation, is willing to wait out the effects of degradation before issuing its retaliatory orders.\textsuperscript{356} In general, HF communications systems thus represent a relatively flexible and easy way of contacting distant components of a dispersed force-in-being. Even more to the point, however, these systems already exist in India and are used by each of the armed services, civil aviation, the broadcasting system, and other

\textsuperscript{354} Even if the increases currently hypothesized in Chinese nuclear force capabilities actually occur as a result of U.S. NMD/TMD initiatives, it is not clear whether China will be able to mount comprehensive counter-C\textsuperscript{3}I attacks against India so long as its targeting allocations vis-à-vis the latter remain more or less constant in absolute terms. Nothing in China's current or projected strategic nuclear doctrine suggests an interest in nuclear war fighting, and planning to interdict its adversaries' C\textsuperscript{3}I capabilities would in any event require far more warheads that those currently projected for China. For assessments of changes in Chinese force size as a result of U.S. NMD/TMD developments, see Steven Lee Myers, "Study Said to Find U.S. Missile Shield Might Incite China," New York Times, August 10, 2000.


national agencies. Obviously, these technologies are not ideal for improvising complex war plans involving widely separated elements of a force, but they are sufficient for issuing brief encrypted launch orders and for confirming the receipt of the same *so long as specific retaliatory options, authenticating procedures, and coordination plans have been developed prior to a conflict.* If dissemination of the launch order and confirmation of receipt are all that India's nuclear doctrine requires for effective connectivity and assured retaliation, New Delhi need not invest in more exotic low-frequency (LF) communications technologies—as did the United States—in order to benefit from the better immunity to nuclear effects these systems offer in their ground-wave propagation mode.\(^{357}\)

The third capability that New Delhi already has, and that will be made available in even better form in the future, is satellite-based communications provided either through its own dedicated space systems or through access to international satellite networks that can be readily accessed by mobile devices within India. Satellite-based communications systems, which usually operate in the superhigh-frequency (SHF) and UHF bands, are purely line-of-sight systems.\(^{358}\) Ordinarily, such systems would require several relays to effectively transmit information over long distances. Since most communications satellites are placed in GEO orbit, however, they automatically acquire line-of-sight contact with more than 80 percent of the hemisphere beneath them and consequently become perfect instruments for wide-bandwidth, high-data-rate communications. Wide bandwidths and high data rates not only allow for reliable voice communications between multiple users but also allow for the transmittal of data, images, and sensor information concurrently. More important, they allow multiple users to interact simultaneously in different media, even as they exchange large quantities of data electronically—and this flexibility enables satellite communications systems to support the kind of audio- and video-conferencing capabilities that are necessary if nuclear operations are to be improvised or conducted on an ad hoc basis prior to execution. The VSAT sys-


\(^{358}\)Satellite-based communications systems are described at some length in Carter, "Communications Technologies," pp. 242–250.
tems in which India is increasingly investing would thus provide both clear and encrypted voice, data, fax, and video transmissions and would permit demand assigned multiple access (DAMA) capability, which allows hundreds of users to share a single satellite communication channel based on need or demand.\textsuperscript{359}

At the present time, India does not have any dedicated military communications satellites, but it does have six multipurpose spacecraft that are currently operational. These six “birds,” consisting mainly of satellites from the INSAT-2C/D/E series, provide some 80 transponders in the C, S, and Ku bands that are used for telecommunications, TV relay, data collection, search-and-rescue operations, and meteorology.\textsuperscript{360} These capabilities will further increase with the launch of the INSAT-3 series, as it is expected that the eight or nine spacecraft in this series will provide India with some 130 transponders for ready use by the year 2002 and approximately 150 transponders through the first decade of this century. Although these INSAT spacecraft can and do support Indian military operations, they are still not dedicated military communications satellites. One authoritative Indian source has noted that the ISRO has already conducted numerous studies to define a satellite communications system appropriate for the armed services. Because such a dedicated system would need to be accessible by an extremely large number of users from a wide variety of fixed and mobile terminals, these studies have concluded that “[a] minimum of two full satellites at any time will be required to be produced in future.”\textsuperscript{361} It is further believed that usage requirements alone would mandate replenishment launches “every three years or so, . . . [in order] . . . to [continually] maintain the system.”\textsuperscript{362} Clearly, producing a dedicated military communications satellite is well within India’s technical competency. Moreover, the advent of the GSLV will in fact enable India to launch 2.5-ton-class satellites into GEO transfer orbit, and by all in-

\textsuperscript{359}``VSATs Are Very Competitive,’’ \textit{Indian Express}, February 4, 2000, and Dhiraj Ahuja, “The Extra Terrestrial Connection,” \textit{Dataquest India}, November 15, 1996.


\textsuperscript{362}Ibid.
dications some kind of augmented—if not dedicated—military space communications platform will certainly be deployed by New Delhi within this decade.\textsuperscript{363}

For all their advantages, however, satellite communications systems do have vulnerabilities. For example, the uplinks and downlinks to the system can be jammed; the ground infrastructure necessary to control the satellites’ operation can be interdicted by nuclear or conventional means; and the space platforms themselves can be attacked by antisatellite (ASAT) weapons. Although the last contingency could become relevant over the next two decades because of China’s emerging ASAT capability, this threat would likely be least effective against communications satellites parked in GEO orbits.\textsuperscript{364}

In any event, New Delhi has already secured gateways to international satellite communications systems that can be readily accessed even by personal handsets from anywhere within India. With systems like Motorola’s Iridium and Globalstar (and their commercial successors, such as Agrani, Thuraya, ACeS, Reliance, Constellation, and Orbcomm), Indian security managers will acquire fairly simple but operationally significant means of disseminating launch orders in an emergency through, if nothing else, global mobile personal communications systems. A system configured like Iridium may not require any ground stations within India for managing communications traffic and would remain immune to military attacks even in the context of a bitter Sino-Indian (or Indo-Pakistani) war simply because it represents a third-party asset that is always available for use by any subscriber.

The expected proliferation of such systems, when combined with India’s growing access to other foreign commercial satellite com-


\textsuperscript{364}Chinese interests and emerging capabilities in this area are described in Stokes, China’s Military Modernization: Implications for the United States, pp. 117–123.
munications systems,\textsuperscript{365} implies that New Delhi will possess additional levels of communications redundancy: So long as all the relevant custodians of New Delhi’s force-in-being are equipped with portable handsets capable of accessing GMPCS satellites, the dissemination of launch orders, report-back, and even teleconferencing can be conducted prior to executing retaliation. Obviously, the presence of such capabilities in no way obviates the need for preplanned operations, but since such preplanning will presumably take place as a matter of course, India’s ready access to international satellite communications systems will only enhance its capacity for nuclear retaliation despite the damage that its command system may otherwise suffer. As Jasjit Singh concluded, hyperbolically but accurately, “In today’s world, a motorized cell phone connected to a satellite will do the job.”\textsuperscript{366} as far as ensuring strategic connectivity is concerned.

Finally, and in addition to the three capabilities described above, India already possesses a fourth communications system that is actually somewhat premature from the perspective of nuclear operations. As part of the ambitious naval modernization conducted during the mid-1980s, the Indian Navy constructed a very low frequency (VLF) broadcasting station at Vijayanarayanan in the southern Indian state of Tamil Nadu.\textsuperscript{367} This VLF facility, which is currently operational, is used primarily by the Navy to communicate with its conventional attack submarines. If and when India acquires a ballistic missile submarine, this facility would become crucial because it would permit the national command authority to issue launch orders to submerged boats operating at depths of a few meters. VLF waves propagate over long distances—almost a quarter of the globe away—and are generally immune to the atmospheric disturbances caused by nuclear explosions. Their small bandwidth, however, limits the rate at which data can be transmitted, usually allowing only for the

\textsuperscript{365}For an excellent examination of the utility of such systems for defense communications in the context of the United States (but with clear applications to India), see Tim Bonds, Michael G. Mattock, Thomas Hamilton, Carl Rhodes, Michael Scheiern, Philip M. Feldman, David R. Frelinger, and Robert Uv, Employing Commercial Satellite Communications, MR-1192-AF (Santa Monica: RAND, 2000).

\textsuperscript{366}Cooper, “Nuclear Dilemmas—India.”

operation of slow teletype. If India's preplanned nuclear options are appropriated coded, VLF broadcasts would allow for the dissemination of such codes slowly but fairly reliably. Thus, they could be used to transmit nuclear release orders both to submerged vessels and to land units if the latter are suitably equipped with receiver terminals capable of picking up VLF signals. This medium of transmission, however, would truly be a system of last resort because the alternative technologies available to New Delhi—landlines, HF radio, and satellite communications in the form of both global mobile systems and VSATs—are far more flexible and rapid than VLF. Because submerged vessels cannot access landlines and HF communications, however, VLF will continue to remain the transmission method of choice for naval purposes. Yet when India deploys a true ballistic missile submarine it could acquire an airborne VLF transmitter similar to the U.S. Navy's TACAMO if it desires to minimize the vulnerability of the large terrestrial VLF installation currently in place at Vijayanarayanam.

In all probability, though, India is likely to forgo the acquisition of such exotic systems because, as the analysis suggests, New Delhi already enjoys several advantages with respect to strategic connectivity. First, the number of Chinese and Pakistani warheads that would be allocated to Indian targets in general and to counter-C3I mission in particular is relatively small, implying that many of India’s command assets would survive even if the face of what would otherwise be unprecedented damage in the event of a nuclear attack. Second, New Delhi already possesses several of the communications systems Indian analysts desire—and though these systems were acquired primarily for conventional military or other civil operations, they could readily be used for strategic C3 if New Delhi made the investments required to increase their number, hardness, mobility, and distribution either in connection with nuclear mission planning or as part of ongoing improvements in India’s communications infrastructure. Third, India’s operational requirements with respect to ensuring connectivity are generally simple: The system must primarily be able to disseminate launch orders and receive confirmation of message receipt rather than enabling full report-back, as is required by

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strategies emphasizing flexible or ad hoc retargeting. Fourth and finally, New Delhi benefits from its doctrine of delayed retaliation in that the advantages of not being committed to a strategy of prompt response free India from the burden of investing in complex and overly redundant communications systems, since it can take as long as it needs to reconstitute its C^3I network before it exacts nuclear retribution.

All things considered, therefore, New Delhi appears to be much better placed to execute its retaliatory strategy than many analysts give it credit for. Moreover, it often goes unrecognized that since the 1980s, all three Indian armed services have undertaken a comprehensive modernization of their C^3 systems in order to enhance their bandwidth, reliability, diversity, and security. To be sure, Indian security managers will obviously undertake a thorough systems analysis of the communications vulnerabilities existing along the entire length of their command chain—especially as this might be stressed under different scenarios of nuclear conflict—but such an analysis is likely to suggest that so long as New Delhi seeks to deploy some kind of a force-in-being rather than a ready arsenal, what it probably needs are many small and focused supplementary investments as opposed to large new programs aimed at replicating some facsimile of the communications infrastructure maintained by the U.S. and the Soviet Union during the Cold War.\(^{370}\)

**Warning and Assessment Capabilities.** A similar judgment applies to the necessity for warning and assessment capabilities. Here too, many Indian analysts have levied extensive demands on New Delhi. One senior retired military officer, for example, has argued the need for “full and continuous intelligence on the location, movement and...installation of the [adversaries’ nuclear] SSMs [surface-to-}

\(^{370}\)This conclusion is corroborated by New Delhi’s initiation of a small (Rs. 600 crore) Defence Communication Network Project (DCNP) to integrate all the existing communications systems possessed by the three armed forces, the Ministries of Defence, Home, and External Affairs, and the paramilitary forces. The DCNP is expected to focus mainly on netting together the different existing terrestrial networks and satellite overlays in order to create “synergy” between the different users and to maintain robust links between the command headquarters and their subordinate echelons through multiple open and secure voice and data links. See Srinjoy Chowdhury, “Communication Network to Link Armed Forces with Ministries,” *The Statesman*, August 11, 2000.
surface missiles] along with their command and control links and organization [as well as] the [ir] nuclear weapon aircraft.” What is most important, he concludes, “is that there should be real time intelligence with Air HQ in peacetime and with the OCP [the nuclear operations command post] whenever it is activated.” 371 Arguing this point further, Nair notes that “while satellites would be a part of the system to provide these inputs, the country needs to maintain a visible air element for both ELINT [electronic intelligence] and photo reconnaissance [PR]. The existing infrastructure with the Indian Air Force would have to be upgraded technologically to meet these demands, and suitable communications links integrated into the strategic communication network.” 372 The National Security Advisory Board, in its Draft Report, also argued laconically that “deterrence requires that India maintain . . . effective intelligence and early warning capabilities.” 373

In a less ambitious vein, another scholar—reiterating some of what has been written in India on this subject—has noted that “the demands of early warning are technical in part and human in part. Early warning satellites, airborne reconnaissance and over-the-horizon radar are vital [but] human systems of a high order are a necessary supplement.” 374 This judgment coheres well with the assessments of U.S. analysts like Neil Joeck, who concluded that “strategic and tactical warning must be improved” 375 if nuclear stability is to be enhanced in South Asia. Other Western commentators, however, have gone beyond Joeck’s carefully limited inference to assert that “India and Pakistan have taken up nuclear positions rife with the potential for military and political miscalculation,” among other things “because neither country has [a] state-of-the-art early warning and intelligence-gathering capability.” 376 Such views, which are common in popular Western commentary, appear to be

371 Gupta, “Detonations Don’t Make Deterrence.”
372 Nair, Nuclear India, p. 192.
based on the somewhat dubious premise that the absence of technologies for tactical warning not only results in an inadequate deterrent but inevitably creates deterrence instability as well.\textsuperscript{377}

The range of technologies, systems, and organizational issues that bear on the question of how to provide adequate warning and assessment are large and complex, and consequently it is useful to assess this problem by relating the need for such capabilities to India's specific operational requirements.

The purpose of any warning and assessment system in the nuclear realm is to enhance the survivability of a country's strategic reserves in order to preserve its capacity for inflicting unacceptable damage on an adversary so as to deter attack in the first place.\textsuperscript{378} During the Cold War, the United States relied heavily on multiple systems to provide the tactical notice necessary to flush manned bombers from their vulnerable land bases, bring SSBNs and land-based ICBMs to ready status, and prepare the command system to execute intricate launch-on-warning or launch-under-attack retaliatory strikes if necessary. This warning and assessment complex consisted of a variety of sophisticated technologies that, taken together, were designed to provide early and reliable information about the extent, dimensions, and targets of any unfolding attack directed against the United States. Space-based satellite early-warning systems provided the first signal of ICBM and SLBM attacks because their infrared sensors could detect the intense plumes generated during the boost phase of a missile launch. From that point on, various land-based and, supplementarily, airborne radars located either along the coast or scattered throughout Alaska, Canada, Greenland, and England took over the task of detecting, tracking, and characterizing the nature of the attack mounted by various kinds of missiles and bombers, or missiles

\textsuperscript{377}These arguments are misleading because they do not factor in the size and quality of the opposing nuclear arsenals in Southern Asia, the nuclear doctrines of the three contestants, and their capacity to process attack information even if tactical warning was available.

\textsuperscript{378}See the discussion in Bruce G. Blair and John D. Steinbruner, \textit{The Effects of Warning on Strategic Stability} (Washington, D.C.: Brookings, 1991), for a sophisticated treatment of how the presence of warning systems can affect deterrence, sometimes in dangerous ways—a point that is usually overlooked by well-meaning but often ill-informed Western observers who constantly bemoan the lack of tactical warning systems in South Asia.
alone. The data required to arrive at this determination was fused and processed at NORAD headquarters in Colorado and then rapidly disseminated to SAC headquarters at Omaha, the national command authorities, and the various unified and specified commands throughout the United States, who would then initiate diverse pre-planned responses designed to increase the survivability of the force components assigned to them—if these were not immediately committed to executing a rapid retaliatory response. Finally, as the incoming attack was consummated, various space-based multispectral sensors would identify the number, location, and yield of the nuclear detonations taking place over U.S. territory, thus completing the assessment required to enable command authorities to determine the nature and extent of their retributive response.\(^{379}\)

The objective of investing in such an expensive integrated warning and assessment capability was to increase the fraction of nuclear assets that would survive a deliberate Soviet attack. Ensuring the success of this objective became particularly important because as Soviet nuclear capabilities grew in number, diversity, and accuracy, the vulnerability of U.S. strategic assets also grew proportionately, and significant portions of the triad—the manned bombers, for example—turned out to be highly dependent on reliable early warning for their survival. In any event, the desire to maximize the largest possible fraction of the force surviving a nuclear attack was fundamentally rooted in the demands of American strategy: The simple strategy of “assured destruction” could have been successfully executed even in the complete absence of strategic and tactical warning because the war loads carried by all surviving American SSBNs were more than sufficient to destroy every Soviet city of any consequence. U.S. nuclear strategy, however, was never oriented toward deterrence by punishment—that is, simply achieving “assured destruction”—as is often erroneously assumed. Rather, it focused singlemindedly on deterrence by denial, which was intended to prevent the Soviet Union from securing victory by eliminating U.S. counterforce assets, thereby compelling Washington to choose between “surrender” or

“countervalue” attacks that would further result in the complete destruction of all American cities.\textsuperscript{380}

Because frustrating this logic of victory was deemed to be essential for strategic stability, the United States had to preserve the largest possible fraction of its counterforce capabilities even in the face of a massive Soviet first strike. One way to preserve these capabilities was simply to initiate preventive or preemptive attacks designed to interdict Soviet counterforce assets before they could actually be employed. Thanks to all the political, technological, and moral burdens associated with such a course of action, American decisionmakers settled for the second, more expensive alternative: to build a massive warning and assessment capability that would provide reliable notice of an incipient Soviet strike, thereby allowing U.S. forces to disperse in order to increase survivability or be launched prior to absorbing the vast incoming attack. If such an attack was only of limited dimension, then the warning and assessment system became essential simply to ensure a proportionate retaliatory response. In all instances, however, adequate tactical warning and assessment became critical for the success of America’s nuclear strategy.\textsuperscript{381}

The demands imposed on India’s strategic capabilities are dramatically different. To begin with, New Delhi does not propose to acquire an arsenal anywhere near the size or complexity of the U.S. nuclear force. Further, it does not intend to create a ready arsenal in the first instance but only a force-in-being composed of latent capabilities that could be fused together to produce a deterrent when required in extremis. Moreover, India also does not face any adversaries today—and will probably not face any adversaries for at least another two decades—that resemble the Soviet Union in terms of the size, quality, and depth of their nuclear capabilities. Despite these differences in circumstance, however, there is no doubt that stable deterrence in South Asia also requires that India maintain relatively survivable nuclear assets, even if only as a dispersed force-in-being. Ensuring this survivability in fact remains the \textit{sine qua non} for India’s continued safety in the nuclear age, but the challenge facing New

\textsuperscript{380}Ball, “U.S. Strategic Forces: How Would They Be Used?” pp. 31–60.

Delhi is not simply that of assuring the survivability of its strategic resources but rather assuring their survivability without having to reproduce the gigantic, costly, and operationally demanding warning and assessment capabilities that the United States maintained in order to generate reliable tactical warning.\textsuperscript{382} The logic of India's no-first-use doctrine also eliminates the prospect of ensuring survivability through preventive war or preemptive strikes. Consequently, New Delhi must resolve the challenges of survivability in a different way—and the solution represented by its force-in-being suggests that survivability will be maintained primarily through "a combination of multiple redundant systems, mobility, dispersion and deception."\textsuperscript{383}

This insistence on thorough opacity with respect to the number, location, and disposition of various elements of its retaliatory force implies that India will seek to ensure survivability primarily by denying its adversaries the information they need to perfect the targeting strategies essential to the successful execution of a "splendid first strike." Since the survival of these elements is fundamentally dependent on uncertainty about their location either in peacetime or during a crisis, the survivability of the Indian force-in-being also turns out to be \textit{substantially independent of warning—or, at least, tactical warning}. If so, New Delhi is freed from the burden of maintaining both the warning and assessment systems and the operational readiness postures that the United States had to sustain during the Cold War. Obviously, all other things being equal, having tactical warning about an incipient attack is better than not having such warning—but other things usually are not equal, and the huge costs associated with producing tactical warning systems would simply be wasted if the operationally dormant (i.e., the standard) disposition of the force-in-being does not allow the survivability of these reserves to be enhanced as a result of such received warning. Vijai Nair corroborated this judgment perfectly when he noted that "the time of flight of missiles from Pakistan and Tibet to targets in India is so lim-

\textsuperscript{382}Chengappa, "Worrying over Broken Arrows," pp. 30-31.

ited, that even if a launch is detected, not much can be done to neutralise it.\textsuperscript{384}

In such circumstances, it is probable that New Delhi will invest the resources it might otherwise have frittered away on extensive tactical warning and assessment systems to further increase the locational uncertainty surrounding its strategic reserves. To be sure, some fixed targets by their very nature cannot be hidden from view, and this implies that large aim points like cities, air bases, and cantonments as well as other permanent military facilities like logistics centers and storage depots will always be vulnerable to a surprise attack. However, if India adequately disperses, conceals, and camouflages its strategic components while maintaining strict secrecy about their number, location, and disposition, no adversary can be certain, even in a crisis, that the damage-limiting strikes it may contemplate against fixed targets would in fact immunize it from the painful consequences of future Indian retaliation. Thus, even if many civilian and military installations remained vulnerable to attack, the uncertainty with respect to whether such attacks would eliminate India's nuclear reserves would contribute more to their survivability than any acquisition of tactical warning and assessment systems.\textsuperscript{385} Despite what some Indian military officers may say, New Delhi does not require any technologies that provide "full and continuous intelligence on the location, movement and the installation" of its adversaries' nuclear capabilities to ensure the success of its force-in-being.

\textsuperscript{384}Nair, Nuclear India, p. 192.

\textsuperscript{385}This conclusion seems to be conceded even by Raja Menon, who, while acknowledging that "there would probably not be many in India who would positively opt for an early warning system," nonetheless defends the acquisition of such capabilities on the grounds that the "320 seconds" of warning provided by such a system may be worth it "if this is the only time available to sound air raid sirens, get people into shelters and warn the target areas" of the imminent attack. See Menon, A Nuclear Strategy for India, pp. 261–264. While this reasoning is sound in principle, Indian security managers appear to have concluded today that the costs associated with truly benefiting from the availability of tactical warning—that is, both the costs of the tactical warning systems themselves and the enormous expenses associated with the construction of nationwide civil defenses—are better allocated to the retaliatory components of the nuclear deterrent itself and to other investments that better contribute to preventing deterrence breakdown rather than to coping with the consequences of deterrence failure. This logic of this posture, which is fully consistent with an acceptance of mutual assured vulnerability, underlies the remarks made by Santhanam, Iyengar, and Arunchalam in "Panel Four: Nuclear Weapons and the Balance of Power."
Consequently, Indian security managers are unlikely to emphasize the acquisition of such capabilities over the next two decades.

So long as India's nuclear reserves are opaque and are maintained in the operationally dormant condition associated with a force-in-being, the acquisition of tactical warning and assessment systems will not enhance their survivability at all; all that such systems may do is enable Indian decisionmakers to calculate what the size of their residual force is likely to be if all the attacking weapons launched by the adversary detonate successfully on their intended targets. Having such information prior to the conclusion of an attack would be useful if India had a strategy of prompt response. With a doctrine of delayed retaliation, however, the utility of possessing such information immediately is more ambiguous. The only advantage that could be unambiguously attributed to the possession of tactical warning systems is that New Delhi would be able to conclusively determine who was launching a nuclear attack directed against India. And while this capability again represents an advantage of some sort, it presumes an operational environment that bears little resemblance to that perceived by New Delhi. In a practical sense, the only countries likely to launch nuclear attacks on India are China or Pakistan. Neither is believed likely to launch such attacks out of the blue, and such attacks are not expected to occur outside of an evolving political crisis or preparation for a conventional war. Consequently, determining the identity of the state launching a nuclear attack is unlikely to be a particularly difficult matter in practice and certainly does not appear to embody the kind of difficulty that should compel New Delhi to acquire the complex tactical warning systems built around distant early-warning and over-the-horizon radars, satellite-based infrared detection platforms, and other terrestrial systems that are described as being relevant for this purpose.386

The bottom line, therefore, is that India does not need tactical warning capabilities for the success of its force-in-being. Such capabilities made sense primarily in the context of the strategic

predicament the United States and the Soviet Union faced and in the context of the operational postures maintained by these two states. Countries that escaped these problems did not invest in comparable kinds of warning and assessment systems. China remains a classic example here: It did not acquire such capabilities throughout the Cold War and still does not possess them. 387 This may not even change over time, but if it does, it will be because Beijing moves more closely toward a nuclear war-fighting doctrine that emphasizes limited nuclear use or damage limitation, in contrast to its traditional posture of simple countervalue retaliation executed in the context of a delayed second strike. This conclusion, however, is not intended to suggest that India needs no warning and assessment systems whatsoever; instead, it is meant to affirm that New Delhi does not need the kinds of tactical warning systems that many Indian analysts, borrowing uncritically from the American experience of the Cold War, claim it ought to acquire.

The capabilities that India needs—and that New Delhi will in fact acquire over the next few decades—are those that enable strategic, not tactical, warning and assessment. To reiterate a well-known distinction, strategic warning and assessment systems foretell the possibility of impending war, while tactical warning and assessment systems signal either imminent attacks or attacks already under way. 388 Most Indian analysts who argue for the latter kinds of capabilities, which allow for real-time or near-real-time updates about an adversary’s military operations, presume that New Delhi will engage in preemptive strikes or even initiate nuclear wars. Referring to the first kind of response, for example, a former Indian Air Vice Marshal advocated “offensive action” claiming that “it would be logical . . . that right at the commencement of hostilities, or in pre-emptive action, the [Pakistani] Ghauri and the [Chinese] SSMs in Tibet, their installations and infrastructure, be destroyed or damaged to make them unusable.” 389 Referring to the second kind of response, one Indian


389 Gupta, “Detonations Don’t Make Deterrence.”
civilian analyst noted that "we may find that Pakistan poses its choices to us in a less than clear-cut manner while compelling us to react in an all-out manner, resulting in our initiation of nuclear war or [responding by] surrender." While these arguments represent conundrums made familiar by the Cold War, India's nuclear doctrine and force posture are designed to avoid both alternatives to the maximum extent possible.

In fact, Indian policymakers, being overwhelmed by the political significance attributed to the possession of nuclear weapons, often tend to err in exactly the opposite direction: refusing to think seriously about the contingencies involving nuclear use rather than jumping at the prospect of designing clever nuclear-use strategies. In any event, it is important to recognize that New Delhi simply does not and will not possess the resources to engage in satisfactory damage limitation vis-à-vis China (and Pakistan, for that matter) through either preemptive action or premeditated first strikes, although some marginal attrition strategies pursued through conventional means are possible if the nuclear-use contingency is preceded by a lengthy conventional war. Beijing's nuclear superiority over New Delhi and the geographic location of China's nuclear assets vis-à-vis India's force-structure weaknesses prevent damage limitation stratagems from even being contemplated in the Sino-Indian case, while Pakistan's emphasis on producing a wide variety of mobile delivery systems in significant numbers—all tightly integrated into its strategic planning and conventional war-fighting capabilities and ready for rapid, efficient, and covert dispersal—actually ensures that even if Indian damage-limiting strikes are contemplated, successful interdiction of these reserves is unlikely unless it is presumed that New Delhi would actually unleash a bolt-out-of-the-blue attack without any provocation. While such an action is of course possible in theory, it strains credulity to think that India would ever behave this way in practice. Neil Joeck reaffirmed this conclusion in the Indo-Pakistani context by succinctly asserting that "India and Pakistan's invulnerable nuclear capabilities make it unlikely that either would plan a preemptive attack."391

391 Joeck, Maintaining Nuclear Stability in South Asia, p. 56.
This judgment leaves India with the need mainly for strategic warning and assessment capabilities. Yet the technical components contributing to such capabilities are often difficult to describe because, as one authority put it, they "read like a Baedeker of applied science." Moreover, strategic warning in itself represents a much more complicated endeavor than the technologies that support it, in part because "the signs of imminent attack are [invariably] much more varied and ambiguous than the physical signatures of missiles or aircraft in flight." Strategic warning no doubt requires technology, but it is simply not as technology-dependent as tactical warning usually is; it may even use many of the same technical systems employed by the latter, but these instruments are generally organized, directed, and used in different ways. Unlike tactical warning, which concentrates on the narrow challenge of detecting specific physical signatures of weapons in operation, strategic warning addresses the wider domain of intelligence gathering and politico-military assessment and as such, requires not so much specialized gadgetry as an integrated intelligence collection and analysis capability that allows the national leadership to make informed judgments about an evolving political situation. This in turn requires, among other things, "an efficient intelligence service and research staff, dedicated to strategic and nuclear issues" and an organizational structure capable of evaluating important indicators in order to "render proper advice and formulate appropriate options."

The technical capabilities required to support many of these activities already exist in India in embryonic form. Although India does not possess dedicated surveillance satellites, for example, it has an impressive space-based remote sensing program. The Indian Remote Sensing (IRS) series currently in orbit have, among other things, panchromatic cameras with a resolution of 5.8 meters.

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393 Ibid.
394 Bajpai, "The Fallacy of an Indian Deterrent" p. 163.
395 Nair, Nuclear India, p. 117.
396 Michael Mecham, "Cost-Conscious Indians Find Profits in Imaging Satellites," Aviation Week & Space Technology, August 12, 1996, pp. 59–60. This level of resolution does not imply that the satellites are unable to see objects smaller than 5.8 meters but merely signifies that they cannot distinguish between two objects that are closer than
resolutions generally necessary for any surveillance system are in principle a function of the size of the object and the level of precision required for the specific intelligence task; airfield facilities, for example, require resolutions of 6 meters for detection, 3 meters for precise identification, and 0.15 meter for technical analysis; aircraft require resolutions of 4.5 meters for detection, 1 meter for precise identification, and 0.045 m for technical analysis; missile sites require resolutions of 3 meters for detection, 0.6 meter for precise identification, and 0.045 meter for technical analysis; and nuclear weapon components require resolutions of 2.5 meters for detection, 0.3 meter for precise identification, and 0.015 meter for technical analysis.\textsuperscript{397} While Indian satellites are certainly not capable of such performance, they will at least be able to locate many important objects of interest when their 2.5-meter-resolution panchromatic cameras are deployed aboard the IRS-P6 satellites early in this century.\textsuperscript{398}

These improvements notwithstanding, India's current spacecraft are not ideal as military reconnaissance systems in part because their cameras operate only in the visible and near-infrared portions of the spectrum and because their revisit times are generally poor. These limitations will be redressed somewhat by the new generation of satellites likely to become available within a few years, which will carry a mix of electro-optical cameras, thermal infrared sensors, and synthetic aperture radars.\textsuperscript{399} At the same time, however, it is believed that even if the currently operational satellites were to reach their optimal orbits, "it w[ould] cut revisit times for imaging any locale from five days to three."\textsuperscript{400} All in all, then, India already has some modest space capabilities that can contribute to strategic warning.


\textsuperscript{398} "Growing Pains," p. 17.


\textsuperscript{400} "Growing Pains," p. 17.
and within the next two decades it is likely to develop a new generation of dedicated, low-earth-orbit military reconnaissance satellites that are capable of providing visual, infrared, and radar imagery. The Indian Air Force has already argued that "success in future wars will depend on the ability to deploy space-based resources for surveillance, battlefield management and communications," and it is believed that the government of India will support the acquisition of a small number of satellites dedicated to the communications and military reconnaissance mission in the near term.

After the Kargil crisis of May 1999, the government of India, sensitized to the need for new surveillance and warning systems, authorized a new cluster of technology initiatives focused on rapidly increasing India’s imaging capabilities through the acquisition of both high-endurance unmanned aerial vehicles (UAVs) and new space-based systems together with their associated ground-based control centers and image-processing facilities. In the latter area, the most significant initiative has reportedly been the rapid reorientation of the existing IRS program to produce a new Test Evaluation Satellite (TES) capable of 1-m resolution. This imaging satellite, which is expected to be launched on India’s PSLV sometime early in this decade, will apparently be based on the design of the 2.5-meter-resolution IRS-P5 Cartosat but will be deployed in a lower orbit of approximately 500 km (compared to the 800-km-odd orbit of the IRS-1C and the 700-km-odd orbit of the IRS-1D) in order to secure a 1-meter-equivalent resolution. Over the longer term, Indian strategic planners have concluded that the country would require a constellation of approximately six dedicated surveillance satellites if New Delhi seeks to observe the status of critical facilities and formations in China and Pakistan twice or thrice daily. Whether the new TES satellite is envisaged as being a precursor to such a surveillance

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401 India: Indian Air Chief: War Success to Depend on Satellites.
405 Ibid.
system is unknown, but the tenor of discussions among Indian technologists suggests that New Delhi will exploit its already-impressive remote sensing program to increasingly support its space reconnaissance activities in the future.

Even though these reconnaissance platforms will continue to lack the state-of-the-art payloads familiar in the West, they will nonetheless suffice to provide Indian decisionmakers with good information about the general status of its adversaries’ military capabilities in the preattack phase, perhaps one of the most important components contributing to adequate strategic warning. It ought to be remembered, in this connection, that India already has real-time or near-real-time access to a wide variety of foreign imagery (including radar imagery) from satellites such as LANDSAT, SPOT, and ERS-1, and this access will only grow in the future as the ISRO’s international activities increase in both sophistication and depth. Of increasing relevance, too, is the fact that New Delhi will have ready access to a new generation of high-resolution commercial earth observation satellites like Space Imaging’s 1-meter-resolution Ikonos, which will be joined by EarthWatch’s QuickBird and OrbImage’s OrbView-3 in the years ahead. Access to the information provided by these platforms—which offer high resolution, a broad range of spectral capabilities, greater timeliness, a growing number of platforms in orbit, and worldwide accessibility—promises to revolutionize the global transparency regime and will endow countries like India, which possess the requisite ground infrastructure to receive the data, the technical expertise to process and analyze the imagery, and the resources required to purchase information about the relatively small swaths of territory of interest to their militaries, with advantages they did not possess before.

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Data from such systems will further supplement the information already procured from India’s manned airborne reconnaissance platforms, from its land- and maritime-based surveillance systems, and from its human assets in the military and civilian intelligence services—and all these resources will then collectively constitute a significant reservoir of capabilities for strategic warning. India’s technical assets, including its own and foreign commercial space-based systems, will also suffice for purposes of damage assessment in the event that India does suffer a nuclear attack. So long as India’s space assets and its associated infrastructure survive an adversary’s first strike—an outcome that Indian policymakers would presumably wish to ensure through future efforts at building redundancy, reconfigurability, and reconstitutibility in their space assets and control systems—New Delhi’s IRS system should provide useful preattack information for strategic warning as well as relevant postattack imagery of the damage India sustains as a result of enemy action.\footnote{India has already demonstrated this capability. In December 1996, for example, “India’s reconnaissance satellite flew over Baghdad in the aftermath of Operation Desert Fox, taking pictures of Iraq’s badly damaged military intelligence headquarters.” Although the “images were not nearly as detailed as those released by the Pentagon,” one report concluded that “the existence of Indian imagery of Baghdad shows how competition is mounting in space.” Vernon Loeb, “Hobbyists Track Down Spies in Sky,” \textit{Washington Post}, February 20, 1999.}

India also has—or will soon acquire—several other supplementary capabilities. It already possesses space-based meteorological, environmental monitoring, and communications platforms, for example, and these too will grow in both number and quality over time.\footnote{These capabilities are detailed in \textit{India, its Space Program, and Opportunities for Collaboration with NASA}, pp. 28–42.} These capabilities are useful for monitoring weather effects on military operations and for supporting adaptive route planning, assessing the effects of damage either suffered or inflicted, and maintaining connectivity between widely spread-out strategic forces. India also enjoys access to many foreign navigation and positioning spacecraft, including the ubiquitous GPS, which allow it to receive accurate location information as well as to deliver many kinds of ordnance, including strategic weapons, with higher degrees of accuracy. In addition, New Delhi has a wide range of terrestrial capabilities, including various kinds of ground- and air-based photographic intelligence.
(PHOTINT) and signals intelligence (SIGINT) systems in addition to its more traditional human intelligence (HUMINT) assets. While India thus requires—and will probably develop—certain technical capabilities to support its strategic warning needs, such as high-bandwidth communications transponders and dedicated surveillance systems in low-earth orbit, the real challenges in this area will lie in the realm of reorganizing its intelligence institutions to collect and evaluate information more effectively.

Strategic warning remains an arena where information fusion, evaluation, and considered judgment matter much more than simply technical data, and while remediating weaknesses in the latter realm is easier to accomplish, it will not suffice if the organizations, procedural routines, and competence required to systematically assess an adversary’s capabilities and intentions remain underdeveloped. One of India’s leading strategic commentators, Jasjit Singh, made this point effectively when he asked rhetorically, “How many specialists on Pakistan does the country [really] have?” Even if this question could be answered in reassuring ways—which it currently cannot—the Kargil crisis amply demonstrated that the principal weaknesses in India’s intelligence system, at least as far as strategic warning goes, lie in fragmentation within its intelligence collection mechanisms; a lack of institutional structures for coordinating collection requirements, collating reporting, and generating unified assessments; and finally an inability to effectively integrate intelligence judgments with decisionmaking at the highest levels of policy.

The ministerial task forces set up in the aftermath of the Kargil crisis have recently made several recommendations to the Prime Minister aimed at remediating India’s traditional weaknesses in the

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411 For a survey of these capabilities, see Ball, Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region, pp. 73–96, and Manoj Joshi, “Signal Wars: Indian Capability in Perspective,” Frontline, September 10, 1993.


area of strategic warning. Among other things, they have urged the creation of a new Defence Intelligence Agency headed by a three-star officer who would control all the technical intelligence collection efforts currently undertaken by the three armed services and the Cabinet Secretariat; the creation of a new National Intelligence Board that, composed of high-level representatives from all of India’s external and internal intelligence collection agencies, would be responsible for intelligence fusion, evaluation, and dissemination at the highest levels of policy; and maintaining the office of National Security Adviser as a permanent position within the government, tasked with, among other responsibilities, heading the National Intelligence Board for purposes of delivering strategic warning to the national command authority. It is currently unclear whether these recommendations will be accepted by the Prime Minister as is—odds are they will be—but the scope of the suggestions leave no doubt that the Indian state is well aware of the importance of strategic warning and will likely work hard to develop the capacity for acquiring such warning in the future.

It is important to note that even if the absence of strategic warning does not make a life-or-death difference to New Delhi’s ability to execute relatively simple forms of retaliation over some extended period of time, the availability of effective strategic warning will certainly enhance its capacity for a coherent response. So long as India maintains a force-in-being, its ability to retaliate will remain a function of the level of uncertainty surrounding the true location of its strategic assets. Because some assets (e.g., nuclear pits and weapon assemblies) are easier to conceal than others (e.g., delivery systems), however, it is obvious that having some strategic warning is preferable to having no strategic warning at all. And while it is possible that even in the absence of strategic warning some elements of India’s retaliatory capability would survive, it is more likely that the size of its residual force and its capacity for efficient, expedited response would greatly increase were strategic warning to be available. Thus, even if India seeks to constitute its deterrent only after it rides out an adversary’s first strike, the breathing space provided by an effective anticipation of attack would enable it to increase its capability to organize

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415 Aneja, “Towards a New Security Architecture”; Aneja, “GoM for Revamp of Defence Management”; and “Service Chiefs to Plan on Control of N-Forces.”
these residual elements. This warning time could be used, for example, to disperse strike aircraft from their traditional bases, flush rail- and road-mobile missiles from their peacetime garrisons, alert the multiple custodians of India’s strategic assets to prepare for possible contingency operations, and sequester the national command authority in safe locations from which they can direct India’s retaliatory actions if deterrence does in fact break down.

Generating effective strategic warning thus requires New Delhi to be sensitive both to the disposition of military capabilities and to the larger political intentions of its competitors. As part of developing this understanding, India’s national leadership must be able to acquire and fuse information arriving from multiple sources—diplomatic, military, intelligence, and international—in order to generate a good assessment of an adversary’s preferences and goals. One analyst has noted that this may involve, among other things, “acquir[ing] intelligence on [the] alert status of hostile nuclear forces,” monitoring potential adversary “launch sites and nuclear capable airfields,” and “monitoring inimical communications that may provide an indication of . . . imminent attack.”416 The object of all these endeavors, obviously, is to prepare for crisis alerting in order to enhance one’s own readiness for war while simultaneously engaging in strategic signaling vis-à-vis the opponent. Strategic signaling, however, often raises concern for analysts, many of whom argue that increasing the alert status of one’s own forces might appear to be escalatory insofar as it signifies a preparation for combat.417 Yet however true this may be in principle, the best crisis management studies during the Cold War suggest that while “any decision to place nuclear forces on alert . . . [is] an extremely dangerous step. . . . it is by no means clear that the inherent risks involved with an alert will always be greater than the dangers produced by refraining from alerting forces.”418

Alerting measures are no doubt unsettling, but if they are restrained and “controlled with the utmost prudence and disci-

416 Nair, Nuclear India, p. 192.
417 Jones, From Testing to Deploying Nuclear Forces, pp. 5–6.
pline, they may in fact yield many of the benefits of crisis diplomacy with few of its disadvantages. Indeed, the most dangerous thing may not even be the decision to alert per se but rather what is done as a consequence of such an action. The ideal situation is one where nuclear alerts increase the survivability of one’s own forces by mandating “reactive” behaviors like dispersal and concealment—essentially limiting the effectiveness of potential attack by an adversary—rather than propelling “proactive” responses aimed at rapidly eliminating the most exposed and vulnerable capabilities of the opponent. Accordingly, the alerted posture dictated by the availability of strategic warning in India’s case is almost certain to take the form of enhanced dispersal and concealment rather than accelerated efforts at preemption—and if past crisis behavior at least in Pakistan is any indication, Islamabad too is likely to disperse its forces for prudential reasons rather than contemplate any hurried preemptive attacks. So long as Islamabad possesses a nontrivial number of mobile delivery systems and New Delhi continues to lack the ability to interdict critical mobile targets—both of which are likely to obtain over the next two decades—there is no need whatsoever for either Pakistan or India to contemplate any proactive responses that emphasize preemption. Even if such responses are contemplated, there is simply no way either state will be able to execute such strategies successfully, at least as far as interdicting counterforce targets is concerned.

419 Ibid.

420 The ideal system, obviously, as Gottfried and Blair phrased it, is one where “both the capability and the endurance of the command system can be significantly enhanced in a manner that does not project threat, at least at first blush.” See Gottfried and Blair (eds.), Crisis Stability and Nuclear War, pp. 237–238.

421 This fact is often overlooked by numerous Western commentators who, while trumpeting the supposed hair-trigger responses that would be mounted, especially by Pakistan, forget that Islamabad’s past behaviors where nuclear operations are concerned have in fact been highly conservative. In the hours leading up to the Pakistani nuclear tests in May 1998, for example, Islamabad, fearing an incipient Indo-Israeli attack on its nuclear installations, generated a strategic alert. While this alert was obviously a product of bad intelligence on both Indian capabilities and intentions, it is important to note that the actions undertaken by Islamabad were reactive and not proactive in the sense described above. See Bill Gertz, “Scare Preceded Pakistan Nuke Test: Expected Strike by India, Israel,” Washington Times, June 1, 1998, for an account of Pakistani actions.
China, too, is likely to conform to just such a behavioral pattern, even though the empirical evidence to support such a claim does not now exist. This fact notwithstanding, China’s general nuclear superiority over India and India’s continuing inability to engage in counterforce attacks aimed at interdicting critical mobile targets even at short range, let alone targets located at vast distances inside the Chinese heartland, imply that neither side has any incentive to pursue proactive responses that would lead to preemption. Moreover, at least one side, India, and possibly both sides, India and China, will continue to lack the technical capabilities that make such alternatives feasible over the next two decades, implying thereby that neither side ought to feel compelled to strike first simply in order to increase survivability even if both sides were to generate strategic alerts in the context of a crisis.

The upshot of this discussion is that New Delhi’s interest in supporting infrastructure will be oriented more toward providing strategic warning and less toward the tactical warning capabilities some Indian analysts advocate—and investing in such resources promises to yield significant payoffs that will enhance India’s nuclear posture. Realizing these benefits, however, will require the nurturing of specialized bureaucratic competencies, focused organizational restructuring, and new policymaking structures that allow for rapid information flows, systematic scrutiny of available options, and greater decisional agility even more than large technical investments.

Strategic Defense. Finally, the last ingredient of supporting infrastructure that is often advocated by some Indian analysts is strategic defense. One commentator summarized these arguments by reminding his readers that “having stepped into the nuclear arena, India has to prepare itself against a nuclear attack.” This aspect, he adds, has two facets: the first consisting of “proper active AD [air defense] system[s]” capable of intercepting enemy aircraft and missiles, and the second consisting of a “suitable passive air defense system.”

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422 Little is known about Chinese nuclear behavior in the context of a crisis, but the best analyses seem to suggest that China’s nuclear posture, at least in the foreseeable future, will continue to emphasize relatively small forces capable of executing delayed second strikes. See Manning et al., China, Nuclear Weapons, and Arms Control, pp. 18–19 and 54–58.

capable of protecting “people in special underground shelters and bunkers.” Other commentators have also endorsed the need for such investments. One former Air Vice Marshal, for example, has argued that although India currently has “no antiballistic weapon system to counter . . . missiles in [their] terminal phase, . . . one can be sure that, if tasked, Abdul Kalam and his team would be able to design and produce our own indigenous and effective ABM [antiballistic missile].” Another retired officer, echoing such views, asserts that “a fine tuned Indian surface-to-air missile [like] Akash . . . could prove a good match to [the capabilities of foreign systems like the] Patriot” and hence should be acquired urgently. The father of the Indian missile program, Abdul P.J. Kalam, also endorsed such views by publicly claiming that India could in fact design a state-of-the-art, space-based strategic defense system that mimicked the capabilities sought by the “Star Wars” program in the United States. To be sure, passive defense systems have their advocates as well. One civilian analyst, for example, citing the example of Russian and Chinese civil defense preparations, has noted that since passive protection would become viable only “if the existing civil defense plans are made nuclear-oriented . . . it is desirable that India should also build its civil defense against [the] growing menace” of nuclear attack. Other, more thoughtful analysts of nuclear issues, such as Nair and Sundarji, are less convinced of the need for strategic defenses. Nair, for example, while not emphatically opposed to such defenses, is more impressed with the ability of even primitive ballistic missiles to nullify sophisticated countermeasures and therefore argues for maintaining deterrence stability primarily by offense-dominant means rather than through defense-dominant approaches centered on substantial missile and civil defenses. Raja Menon, in contrast, seems more supportive of civil defenses, although he does not assess

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424 Bakshi, “Nuclear Euphoria and Harsh Realities.”
425 Gupta, “Detonations Don’t Make Deterrence.”
426 Zutshi, “For a Strategic Defence.”
427 India to Design ABM on U.S. Lines: Kalam.”
429 Nair, Nuclear India, p. 158ff.
either the overall structure or the direct and opportunity costs of such efforts.\footnote{Menon, A Nuclear Strategy for India, p. 264.}

Given the diversity of views on this question, it is unlikely that Indian decisionmakers will ally themselves publicly with any one school, although that does not appear to have stopped the local city government in New Delhi from drawing up an extravagant plan—still unfounded—to construct numerous underground bunkers within the heart of the city.\footnote{Kota Neelima, “Either You Will Be Dead or Crammed in a Bunker with 10,000 People,” Indian Express, July 25, 1999.} Although Indian policymakers are probably most sympathetic to the Nair-Sundarji view of the relative inefficacy of strategic defenses—among other reasons because of their cost implications—they are still likely to acquire some modest active defenses as part of their overall modernization of the Air Defense Ground Environment System (ADGES), an air defense net that has been in place since 1974 and that has slowly been upgraded to cope primarily with regional airborne threats.\footnote{The ADGES is described at some length in George Tanham and Marcy Agmon, The Indian Air Force, MR-424-AF (Santa Monica: RAND, 1995), pp. 47–49.} The ADGES consists primarily of a chain of early-warning radars located around the Indian periphery. These radars, generally optimized for detecting high- and medium-altitude targets, feed information into various air defense control centers that control India’s manned interceptors and strategic SAM batteries (primarily SA-3s) and cue the numerous Army-manned mobile SAM systems and anti-aircraft artillery deployed around many urban concentrations and military facilities. The detected intruders are then engaged by some combination of manned interceptors, SAM batteries, and anti-aircraft artillery en route to their targets. Although the Indian ADGES is fairly coherent, it is by no means a true IAD system where threat data are collected, fused, interpreted, and disseminated electronically to various components of the defensive network.\footnote{Bernard Blake, “Long-Range Air-Defense Systems: A Global Survey,” International Defense Review, 27: 5 (May 1994), p. 41.} In addition, the detection process itself can be spotty depending on the terrain and on environmental conditions. Although the Indian Air Force has attempted to minimize these weaknesses through use of mobile observation posts
and new, indigenously produced gap-filler radars, the ADGES is not yet a robust network capable of coping with a high-threat environment. This may not have been a problem vis-à-vis Pakistan when the latter possessed only manned aircraft, since the existing radars and the large number of manned interceptors in service with the Indian Air Force more than sufficed to bring the air-breathing threat down to manageable proportions. The system is also capable of dealing more or less effectively with intruding Chinese aircraft, although the mountainous terrain along the northern borders greatly diminishes its detection effectiveness. These limitations, however, are less consequential because the People’s Liberation Army Air Force (PLAAF) presence close to the Sino-Indian border has traditionally been minimal and the platforms available for operations have for the most part been obsolete.434

The advent of missile threats to India, however, has changed this picture considerably. As the events surrounding the Pakistani Ghauri test demonstrated, for example, India’s current early-warning radars could not detect high-speed objects with small radar cross-sections.435 This implies that both Pakistani and to an even greater extent Chinese missile flights are currently impervious to detection. If China increases its air presence and bases more advanced aircraft near the Sino-Indian border over time, the northern early-warning net may not be able to detect all such intruders if they attempt to exploit the radar’s shadow zones for purposes of ingress. Not surprisingly, then, the Indian Air Force is committed to modernizing its ADGES to cope with more complex threats.436 This modernization has been justified primarily in terms of improving Indian conventional air warfare capabilities, although it has obvious spillover benefits in the realm of strategic defense. At the present time, the modernization effort appears to focus on three areas: improving physical infrastructure, including “establishing a number of addi-

434 Not surprisingly, then, the Indian Air Force’s Eastern Air Command is, as one observer put it, “more concerned with anti-insurgency operations than with anything else.” Lake, “Indian Air Power,” p. 148. Consistent with this threat perception, the Eastern Air Command primarily has second-line air defense aircraft like Mig-21s in its inventory.


tional airfields in order to plug gaps in the network of existing forward airfields; acquiring improved equipment, which in addition to the space-based platforms referred to earlier will include new airborne early-warning systems, "powerful, long-range coastal radars," and additional radar coverage "to certain areas of north-east India;" and purchasing additional weaponry, the most significant of which are the six S-300 PMU-1 anti-air and ATBM systems India desires. The S-300 systems are intended to be integrated into the existing ADGES, and if India purchases the best radars known to be associated with this weapon, the S-300 batteries would offer greatly enhanced capabilities against all kinds of air-breathing threats while simultaneously posing some kind of challenge to the penetrativity of Pakistan's ballistic missiles, if not China's. If India also acquires the lethal Russian SA-10/SA-15 combination for other generic air defense tasks, its ability to defend its airspace would improve even further.

All these systems, however, are extremely expensive. Moreover, even if they are acquired—which at any rate will not occur imminently—they will not be inducted in more than small numbers and may enter Indian service without the best detection and fire control radars available, thanks to the extraordinarily high costs of the components involved. This implies that these systems, however effective they may be against aircraft, would be less effective against missiles and, as such, would serve to provide more psychological comfort than complete defense. Even if India acquires the most

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437 Sawhney, "India’s First Airpower Doctrine Takes Shape: An Aging Air Force Looks to the Future," p. 34.
438 Ibid.
439 Bedi, "India to Sign New 10-Year Defence Deal with Russia," p. 16.
potent versions of these systems, their small numbers would suffice mainly to diminish—not eliminate—attacks that might be mounted on centers of great political and strategic importance to India, since as one analyst put it, there is no "silver bullet in missile defense." In all probability, New Delhi is unlikely to acquire anything other than a thin ATBM defense capability over the next decade. Rather, it will continue to rely primarily on the logic of punishment—meaning the threat of “delayed—but assured—retaliation”—to prevent nuclear threats to the homeland, with its few defensive systems serving only to minimize attacks on critical targets and provide some forms of psychological assurance.

Since these systems essentially represent token defenses, they will almost certainly be ineffective against all Chinese strategic missiles and may be ineffective against many Pakistani ballistic missiles as well. This difference in outcome hinges in the first instance on the fact that the reentry velocity of many Pakistani systems is substantially lower than that of their Chinese counterparts. While the former threats generally fall within the target velocity intercept parameters of ATBM systems like the S-300 PMU-1, the latter clearly do not. The lower reentry velocity of most Pakistani missiles does not imply, however, that such missiles can invariably be intercepted by India’s ATBM defenses if and when these are deployed; to the contrary, the capability to successfully intercept here will be substantially diminished by India’s lack of space-based missile warning systems, the technical inadequacies of its long-range early-warning radars, and the still-limited automatic data transfer capability within the ADGES, all of which would combine to deny the terminal intercept systems the cuing information they would need to maximize their effectiveness. Further, even if such information were available, otherwise effective missile defenses could also be frustrated by the presence of penetration aids and by the possibility of saturation—challenges that could become increasingly relevant in the case of both Pakistan and

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443 See Kohlentz, “Theater Missile Defense and South Asia: A Volatile Mix,” pp. 54–62, for useful data on the reentry velocities of different Pakistani and Chinese missiles.
China a decade or so from now. Consequently, all Chinese strategic missiles—and increasingly even its semistrategic missiles—are likely to remain immune to India’s ATBM defenses. And while many Pakistani missiles today would in principle be comparably susceptible to interception, whether a satisfactory defense can be achieved in practice remains dependent on issues that are currently unresolved: the number and quality of the Indian ATBM systems deployed, the effectiveness of future upgrades undertaken within the ADGES, and the availability of some kinds of long-range detection capabilities for early warning and cuing.

Given the costs associated with pursuing these investments in any robust way, it is not at all clear that New Delhi will be any more enamored of thick active defense solutions tomorrow than it is today. Its continued reliance on offensive threats for deterrence stability implies that it is equally unlikely to pursue any large-scale passive defense measures either. Such efforts are, in addition, extraordinarily costly to pursue and organizationally demanding to sustain. In a situation where India relies primarily on strategic rather than tactical warning, meaningful civil defense measures involving evacuation to shelters and the like would also be chaotic and burdensome. The origins of civil defense in India go back to the air raid management efforts launched by the British government during the Second World War—and while these efforts continued with some earnestness until 1971, they were for the most part superfluous during the three conventional Indo-Pakistani wars, since the Pakistan Air Force’s efforts to locate targets in major urban areas were frustrated more by a lack of strategic offensive capabilities than by the valiant though usually successful efforts of local wardens to supervise neighborhood “blackouts.” In the nuclear era into which the subcontinent has steadily slipped since 1974, these measures have become even more

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444 China is likely to respond to U.S. NMD/TMD initiatives both with a buildup of the size of its missile inventory and with increased deployment of penetration aids aboard its missile. Once Pakistan’s missile production plant at Tarnawa comes on line, Islamabad will possess the capacity to produce large numbers of missiles, some of which may not even be armed with nuclear warheads but are nonetheless useful for barrage fires—and if Chinese assistance to Pakistan continues well into the indefinite future, it would not be surprising to find Islamabad capable of integrating penetration aids into its strategic payloads before long.

445 For details, see Seth Drucquer, Civil Defence in India (Bombay: Oxford University Press, 1942).
superfluous to the point of being all but obsolete, and the government of India is thus unlikely to embark on any but the most token efforts to revitalize civil defense preparedness when the viability of such an investment in enhancing urban protection has yet to be demonstrated. The desire for passive defenses will consequently remain the hobbyhorse of a few zealous advocates but is unlikely to become a strategic priority for the Indian state.

This discussion about supporting infrastructure suggests, on balance, that despite possessing many of its constituent components, India still stands some distance away from being a fully effective nuclear weapon state. Even though many of the technologies already exist in an embryonic condition, and despite the fact that sizable new programs may not be necessary to sustain a force-in-being, several specific initiatives are no doubt necessary for the success of this posture. These include some kinds of command facilities; different kinds of focused investments in integrating strategic communications and increasing redundancy; more mature, integrated warning and assessment systems and organizational structures; and perhaps even some modest improvements in air defense and ATBM systems. These investments will no doubt materialize in the future, but the process of accretion will be slow, relatively costly, and hesitant, because the full implications of what is actually necessary will not become apparent through a single epiphany but rather as part of a gradual process of discovery over time.

Procedural Systems

Since India has now formally claimed the status of a nuclear weapon state, little doubt remains that New Delhi will gradually acquire many of the components its force-in-being requires over the next two decades. The process of developing, producing, acquiring, and integrating these components will be measured and often difficult, but the general trend suggests a steady accumulation of strategic capabilities over time. The most conspicuous evidence of this accretion in the near term will lie in the testing of various kinds of de-

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A useful survey of the current state of India's civil defense preparedness can be found in Rajendra Prasad, *India's Civil Defence in the Nuclear Age* (Bareilly, India: Prakash Book Depot, 1980).
livery systems. As described earlier, several Indian commentators have already called for the accelerated procurement of different kinds of hardware, all of which are deemed to be necessary for the success of their country’s deterrent. K. Subrahmanyam argued, for example, that the solid-fueled Agni-II IRBM represents “the crucial factor to reinforce the credibility of our credible minimum deterrent. Without Agni, India will have no credible deterrent.”\textsuperscript{447} Such an emphasis on the material accoutrements of deterrence should not be surprising given the critical lacunae in current Indian capabilities. At the same time, however, the stress that analysts have placed on material implements—i.e., weapons, delivery systems, sensors, and physical infrastructure—also derives from the fact that these components are highly visible and, as such, tend to attract more attention than other dimensions of the force. In this sense, Indian commentary about the country’s strategic requirements often mirrors that of American discussions during the Cold War.\textsuperscript{448} Indeed, such discussions once led three analysts to comment that “an imbalance exists in the study of security in the nuclear age. The process of managing the arsenals is less discussed and less familiar than either the weapons themselves or the doctrinal logic used to define their purposes.”\textsuperscript{449}

In any event, since the material accoutrements of deterrence tend to galvanize the political imagination in a way that “managerial practices for peacetime and plans for wartime”\textsuperscript{450} often do not, it is reasonable to assume that India will in fact produce many of the technical implements required for deterrence over time—and it is likely to do so successfully because the R&D efforts related to the creation of these capabilities enjoy widespread public support as well as the support of important bureaucracies within the Indian state. In any case, the relative effectiveness of systems development

\textsuperscript{448}A handful of Indian analysts, including K. Subrahmanyam, Jasjit Singh, C. Raja Mohan, Vijay Nair, Raja Menon, P. R. Chari, and V. R. Raghavan, remain the exception to this rule, but the vast majority of Indian strategic commentators—like their American counterparts during the Cold War—remain enthralled by the physical accoutrements of deterrence.
\textsuperscript{450}Ibid.
efforts will be easy to measure because defining success is often simply a matter of gauging whether an individual weapon system works as intended. For these reasons among others, the development of the material components of India’s nuclear arsenal is likely to proceed unimpeded.

Even when this process is concluded, however, India will still not possess a complete nuclear deterrent—even if that deterrent is configured only as a force-in-being—if it has not yet developed the procedural systems necessary to direct and control the myriad material and ideational elements that, taken together, are usually viewed as embodying an effective strategic capability. Procedural systems in this context refer simply to the organizational arrangements controlling the design, production, management, and use of all the material and ideational artifacts associated with a nuclear deterrent, however they may be configured. The procedural system is therefore a true “system of systems” insofar as it embodies all the “plans, procedures, organizations, and widely shared assumptions that allow the parts to work together coherently.” Unlike the material and ideational components of the arsenal—which encompass, for example, the weapon systems and the principles of strategy and doctrine, respectively—the procedural system often remains the silent component of any command architecture. This silence is deceptive, however, because “though technology and [doctrinal] logic are important elements [for successful deterrence], security is [finally produced] by human organizations, and the results achieved [ultimately] depend on their performance.” For these reasons, an effective nuclear deterrent requires not only a systemically embedded set of interlocking, complex physical-technical components oriented toward servicing a particular ideational conception of deterrence but also an or-


454 Ibid.
organizational and regulatory framework that controls the entire system throughout its life cycle; beginning with design, continuing through creation, production, deployment, and management, and finally ending, if necessary, in possible employment. The procedural system can thus be seen to serve as the glue that holds all the elements of the deterrence system together insofar as it binds the technology and doctrine into a coherent whole that justifies the creation, structure, management, and use of the nuclear deterrent writ large.\textsuperscript{455}

Since all technical arrangements inevitably embody specific “forms of order,”\textsuperscript{456} the nuclear deterrent—like any other complex technology—also requires organizational and regulatory mechanisms to lend it the coherence, pattern, and telos it needs if it is to be transformed into a usable instrument of national power. As the deterrent system becomes larger and more complex, these organizational and regulatory mechanisms become more numerous and more demanding. Unfortunately, for all their importance, the procedural systems India’s emerging force-in-being requires cannot be definitively described here simply because the size, configuration, and deployment pattern of India’s evolving arsenal have not yet been defined in detail.\textsuperscript{457} As these variables are slowly fleshed out over time, the organizational and regulatory structures necessary to manage the various components will evolve as well and may in some cases be designed anew. The important point, however, is that configuring appropriate procedural systems is an evolutionary process that, at least in the case of the great powers, proceeded at an equal pace with the development and maturation of the nuclear arsenal itself. For this reason, many Western analyses that bemoan India’s lack of “sophisticated procedures to control its fledgling nuclear arsenal”\textsuperscript{458} are usually specious, since they fail to recognize first that


\textsuperscript{457} One well-thought-out example of what the Indian procedural system ought to be with respect to nuclear warhead development, production, and allocation can be found in Menon, A Nuclear Strategy for India, pp. 235–252.

\textsuperscript{458} Dexter Filkins, “India Missile Test Raises Nuclear Bar for Rival,” Los Angeles Times, April 12, 1999.
New Delhi is no worse off than most of the great powers were at a comparable point in their own history, and second that India's emphasis on producing a force-in-being rather than a ready arsenal requires organizational controls—many of which are already in place—that differ from those associated with the delegative nuclear posture maintained by the United States during the Cold War.

While it is therefore difficult to describe every procedural system India needs before its force-in-being fully matures, it is possible to identify three critical kinds of organizational and regulatory components that New Delhi is likely to develop or further refine in the near term: a national command authority, a national security council, and better civil-military coordination.

A National Command Authority. The first critical component necessary for the success of the Indian force-in-being is the formal constitution of something resembling a national command authority. This issue is already being discussed widely among Indian elites and the uniformed military, and the consensus throughout the country is that "the Prime Minister will exercise final control over [nuclear] weapons."\(^{459}\) The National Security Advisory Board affirmed this judgment explicitly when it asserted in its Draft Report that "nuclear weapons shall be tightly controlled and released for use at the highest political level. The authority to release nuclear weapons for use resides in the person of the Prime Minister of India, or the designated successor(s)."\(^{460}\) While this recommendation is consistent with the existing structure of strategic decisionmaking in India, the notion of prime ministerial control in the institutional form of a national command authority will require further systematization. This is the case because bureaucratic supervision of the "nuclear estate" in peacetime is different from preparing to develop, procure, and manage a nuclear force that may one day be committed to undertaking retaliatory operations in the event that a deterrence breakdown results in nuclear attacks on India. Transforming the existing patterns of prime ministerial control into an effective national

\(^{459}\)Kumar, "Nuclearization Calls for Strategic Command."

command authority in turn entails at least four distinct changes in institutional arrangements currently obtaining within the polity.

To begin with, the relationship of prime ministerial authority to presidential power will have to be formally clarified insofar as it pertains to activities and operations in the nuclear realm, even if this means simply explicating what already obtains as a result of tradition, established practice, and previous legislation. Under the Atomic Energy Act, the Prime Minister has formal control over all matters relating to the nuclear realm, and this implies that developing, producing, deploying, and maintaining nuclear warheads are activities overseen by the AEC under the direction of the Prime Minister.461 This structure of control is eminently suited to the force-in-being India currently envisages in that it results in the treatment of nuclear weapons as national assets controlled by civilian security managers rather than as war-fighting instruments routinely controlled by, and under the custody of, the uniformed military. Since the purpose of acquiring nuclear weapons, however, is to maintain them in constant readiness for possible use no matter how unlikely this contingency may be, minimal but nonetheless formal coordination between prime ministerial authority and presidential power will be necessary first because only the uniformed military can actually deliver these weapons when required and second because the President of India remains the constitutionally recognized commander-in-chief of all India's armed services.462

In practice, this coordination is rarely a problem because by both tradition and law the President usually assents to all legitimate Cabinet directives pertaining to the use of military power. But because it is possible—though not probable—that nuclear attacks on India may occur in a highly compressed time frame or via a surprise attack, it is desirable that the nature of Prime Ministerial–Presidential consultations with respect to the question of nuclear response be thought through a priori. Important questions that need to be considered in

461 The genesis and logic underlying this arrangement are described in Perkovich, India's Nuclear Bomb, pp. 17–21 and 38ff.

this context include the legality of military responses in situations where the President or his constitutional successors are unavailable, incapacitated, or temporarily incommunicado.\footnote{This problem is emblematic of a set of contingencies that India never had to face prior to its entry into the nuclear age and hence is conspicuous by its absence in all traditional discussions about higher defense organization in India. For a good survey of the traditional issues, see P. B. Chart, "Civil-Military Relations in India," Armed Forces & Society, 4:1 (November 1977), pp. 3–28. Unfortunately, it also seems to be missed in what are otherwise good studies of Indian higher defense organization in the nuclear age—like Kapil Kak, "Management of India’s Security and Higher Defence—I," Strategic Analysis, 22:3 (June 1998), pp. 327–337, and Kapil Kak, "Direction of Higher Defence—II," Strategic Analysis, 22:4 (July 1998), pp. 501–514—suggesting thereby that the role of the President, even in its formal relationship to issues of nuclear war, has not yet received much attention in India.}

Even aside from such contingencies, planning for consultations with the President in the event of nuclear attacks remains a sensible course of action, and these consultations would in any case help the Prime Minister and the Cabinet choose between alternative courses of action that by their very nature embody grave consequences for national security. Even if these practical benefits are overlooked, however, a minimal recourse to Presidential authority is unavoidable if war is to be declared or if India’s military forces are to be committed to nuclear missions as part of its retaliatory response. Public evidence of coordination with the President in authorizing such retaliation has many benefits—especially in assuring the legitimacy of the selected response—but the requirement for public recognition is not strictly necessary. What is important is that all the relevant entities involved in the activities leading up to an act of retaliation harbor no doubt that the chosen course of action represents a national decision—symbolized by consultation with the President—rather than simply a partisan act ordered by an incumbent who happens to hold office.\footnote{While there are few grounds for concern that the President might in fact oppose national security decisions made by the Prime Minister, the historical record in India suggests that presidential power has sometimes been exercised more autonomously than usual when less-than-stable governments have been in power. Given the expectation that coalition governments will continue to dominate Indian politics well into the foreseeable future, consultation with the President about potential nuclear retaliatory responses may be desirable if controversies about the wisdom of some of these actions are to be avoided under conditions of supreme emergency. For a useful survey of the exercise of exceptional presidential power in India, see Paul R. Brass, The Politics of India Since Independence, 2nd ed. (Cambridge, UK: Cambridge University Press, 1994), pp. 45–47.} This concern would not be critical if India were to become a victim of
extensive nuclear attacks. If, however, its retaliatory response was in any way disproportionate to the harm it suffered, the legitimacy of the chosen courses of action would have to be underscored by a variety of symbolic and substantive means.

While the consultations between President and Prime Minister are thus important for both legal and symbolic reasons in a democracy like India—especially where momentous decisions involving the kind of nuclear retaliation are concerned—several other issues are even more critical if the national command authority is to function effectively. The second issue in this context thus pertains to developing an appropriate division of labor within the Cabinet with respect to nuclear matters. As earlier discussions indicated, the Indian Prime Minister remains the ultimate decisionmaker with respect to all questions involving the development and acquisition of nuclear weaponry. Managing a deterrent, however, requires expertise, oversight, and judgment over many more issues than simply nuclear weapons as narrowly understood. Insofar as these questions relate to technical, ideational, and procedural systems, however, they cannot remain the responsibility of the Prime Minister alone, since this office holder is often overburdened by other political and administrative responsibilities. In theory, the corporate responsibility for such matters is ultimately held by the Cabinet Committee on Political Affairs (or the Cabinet Committee on National Security, as it has been renamed), which is composed of the Prime Minister in concert with the Ministers of Home, Finance, Defence, and External Affairs. Unfortunately, many of these office holders, being generalists, are ill equipped to understand the complex problems of nuclear technology, doctrine, or organizational structure. Indeed, the Cabinet Secretary—the principal civil servant tasked with coordinating draft documents from various ministries and submitting the same for Cabinet consideration and approval—is also a generalist who has neither the expertise to assess the challenges relating to managing a nuclear deterrent nor perhaps even the time to develop such a competency if so required.465 These difficulties are exacerbated by the excessive secrecy and compartmentation that often plague Cabinet activities, which frequently leave nominally important ministers oblivious to

the details of key programs managed by the country’s strategic en-
claves.\textsuperscript{466}

What complicates the problems engendered by secrecy is often-
times studied ignorance and lack of interest in the larger issues of
nuclear strategy.\textsuperscript{467} Obviously, professional politicians are not ex-
pected to become experts in the minutiae of nuclear operations—yet
it is not unreasonable to expect that the Indian state would always
have some knowledgeable individuals at the highest reaches of gov-
ernment who can understand, query, and critique the positions the
country’s civil servants, nuclear and defense scientists, uniformed
services, and strategic elites hold on nuclear issues. Unfortunately,
however, this is still not the case.\textsuperscript{468} Maintaining effective command
over the evolving force-in-being would therefore require a new divi-
sion of labor within the Cabinet, and this might in turn involve either
the formation of new institutional structures (such as a new sub-
committee) or the reordering of existing arrangements to ensure that
at least a small subset of Cabinet ministers are administratively if not
legally tasked with developing the expertise required to contribute to
the management of India’s emerging nuclear assets.\textsuperscript{469} Many Indian
analysts have argued—correctly—that acquiring such expertise does
not entail tampering with any of the existing structures of authority:
The prime minister would remain the sole arbiter of all matters relat-
ing to atomic energy, and the CCNS would still function as the corpo-

\textsuperscript{466} Thus it is not clear, for example, whether the entire Cabinet or even key minis-
ters were informed of the Prime Minister’s decision to resume nuclear testing in May
1998 prior to the tests. Chengappa, \textit{Weapons of Peace}, p. 6, lists only four individuals as
having been consulted by the Prime Minister prior to the tests, but this account is dis-
puted by others. The descriptions at various points in Perkovich, \textit{India’s Nuclear
Bomb}, clearly corroborate the fact that throughout India’s postindependence history,
key decisions relating to the nuclear program were made by India’s Prime Ministers
often with little formal consultation and invariably in complete secrecy.

\textsuperscript{467} Subrahmanyan, “Nuclear Policy and Political Culture.”

\textsuperscript{468} It is still not clear, for example, whether India’s elected leadership appreciates
the implications of the international critiques leveled at the DAE’s claims with regard
to the results of the May 1998 nuclear tests. It has been reported that DAE scientists
briefed the national leadership in the aftermath of the tests, but there are no institu-
tional structures that allow for any peer review of the DAE’s conclusions, and the In-
dian Cabinet has no access to alternate sources of expertise to evaluate the claims
made by the official nuclear scientific community.

\textsuperscript{469} For some suggestions on this issue, see Kak, “Management of India’s Security
and Higher Defence—I,” pp. 334–337.
rate guardian of India’s national security. Within these institutions or around them, however, could be a few individuals who would serve as the repository of expertise on nuclear issues—the National Security Adviser being a good candidate—advising the Prime Minister (if he himself is not one of these experts) on critical decisions relating to “what amount, range and variety of [nuclear] capability would be desirable, along with a doctrine which clearly spells out the why, when and how [relating to nuclear] use.”

If such expertise is not developed within the Cabinet or immediately around it, critical problems relating to the thrust of strategic research and development, the size of the nuclear inventory, the shape and disposition of the nuclear arsenal, the operational doctrine governing the maintenance and use of nuclear assets, and the procedural systems necessary to control India’s emerging strategic capabilities would likely owe their resolution to technological momentum, fiscal constraints, bureaucratic rivalry, or mere political expediency than to careful, considered, and deliberate strategy. And should these idiosyncratic variables come to determine India’s nuclear posture, the country’s national command authority would slowly be reduced to the status of a nominal as opposed to a real authority; obviously it would continue to retain control over the metaphorical “button”—i.e., the decision to release nuclear weapons in anger—but it would slowly lose control over the size, structure, and disposition of the forces regulated by that button to elements lying well beyond its command. And such diminishing authority would inevitably result in the replacement of effective control with the mere illusion of control—an outcome whose implications for national security, regional stability, and interstate relations warrant careful consideration in New Delhi.

471 Kumar, “Nuclearization Calls for Strategic Command.”
472 As P. R. Chari, corroborating this argument, once noted, “Policy and strategy become the handmaid of military technology. Advances therein are then accommodated in the defence policy. Regrettably, this is precisely what is . . . occurring in India due to the absence of sufficient thought being given to expressing its defence policy with some degree of precision and comprehensiveness. This is apparent from the lack of any mention of its nuclear and missile deployment policy” in the nation’s overall national security strategy. See P. R. Chari, “Defence Policy Formulation: The Indian Experience,” Indian Defence Review, 11:1 (January–March 1996), p. 32.
If these disadvantages are to be avoided in the long term, there is simply no alternative but to ensure that most senior security managers educate themselves about the dynamics of nuclear strategy. The leadership in every existing nuclear weapon state has had to acquire such competence as part of the burden of ensuring stability in the nuclear age, and India’s civilian politicians cannot remain the exception to this rule. The nurturing of such expertise at the Cabinet level or in small pockets within the Cabinet system also has other advantages; for example, it allows for seamless transitions in an emergency such as that which would occur if the Prime Minister were suddenly incapacitated. Ultimately, achieving effective command performance at the highest levels of authority in India will require a return to the collegial spirit of the cabinet system, wherein critical information necessary to make good decisions is shared freely and important choices with respect to the size, structure, and disposition of India’s strategic capabilities are discussed candidly and without restraint.\footnote{For more on this problem, see V.A. Pai Panandiker and Ajay K. Mehra, *The Indian Cabinet* (New Delhi: Konark Publishers, 1996).}

This pattern of decisionmaking, however, went out of style with the late Prime Minister Indira Gandhi—to the lasting detriment of collective policymaking—and it simply remains unclear, given the era of coalition politics that looms over New Delhi in the foreseeable future, whether the heritage of cabinet responsibility can be recovered sufficiently to enable India to put in place an effective national command authority that can respond to evolving security challenges in a rational, disciplined, and effective manner.\footnote{On this issue, see James Manor (ed.), *Nehru to the Nineties: The Changing Office of Prime Minister in India* (Vancouver, Canada: UBC Press, 1994).}

The third issue pertaining to the development of an effective national command authority pivots on formalizing custodial responsibilities over various nuclear assets in India. The present structure of custodial responsibilities is an inchoate product of tradition and administrative regulation. While the uniformed services are clearly charged with maintaining the delivery systems together with their associated infrastructure and supporting capabilities, the responsibility for nuclear weapons per se is shared by two civilian agencies,
the DAE and the DRDO.475 Yet the exact division of responsibilities between these two agencies has remained a closely guarded secret, although the extent and limits of their obligations are certain to be revised as Indian capabilities mature. The character of these mutual obligations, however, will probably become more explicit over time and will in all probability become increasingly bureaucratic, running the gamut from pure research and laboratory experiments to coordinated and joint testing to prototype fabrication prior to serial production. This increasingly detailed division of responsibilities will also affect budgetary allocations as well as the commitment of specialized personnel to the various working groups that are usually set up within India’s strategic enclaves.476

Such an increasingly bureaucratized division of responsibilities is likely to culminate in an operational plan (or a series of operational plans) specifying the patterns of command, custody, and transfer of various nuclear assets to the end operators—the military—in an emergency. This is critical to the viability of a force-in-being which is structurally centered on a system of “divided control.”477 Indeed, the Draft Report released by the National Security Advisory Board predictably endorsed this expectation, albeit in somewhat florid language, when it affirmed that “an integrated operational plan, or a series of sequential plans, predicated on strategic objectives and a targeting [sic] policy shall form part of the system.”478 Such plans probably exist today, if only in embryonic form, and most of them probably rely on the familiarity of the principal custodians with each other and their acknowledged loyalty to the Indian state to ensure the legitimate transfer of nuclear assets from one point to another within the operational structure.479 As India’s nuclear capabilities

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475Chengappa, Weapons of Peace, p. 391, in fact asserts that the Indian custodial system required “at least three agencies . . . to combine their effort if the bomb had to be readied for a launch,” but it is not clear from his description whether the armed services represent the third body in so far as they would ordinarily have control over the delivery systems.

476The only example of serious analysis of these issues available in the Indian public debate remains Menon, A Nuclear Strategy for India, pp. 235–283.


479See the discussion at various points in Chengappa, Weapons of Peace.
increase in both size and diversity, however, the personalized procedural systems currently in place will quickly reach the limits of their utility—and at that point a more bureaucratized system that relies on prespecified “standard operating procedures”\textsuperscript{480} will be required so that the seamless transfer of custody of various nuclear components can take place during an emergency even in situations where the custodians do not personally know one another.

The creation of the new unified command tasked with overseeing India’s nuclear delivery systems could provide Indian strategic managers with the institutional capabilities necessary to plan, organize, and train for this task.

Developing an effective national command authority would therefore require, as one of its most important components, a clearly specified system of command dissemination, custody controls, and preapproved procedures for the transfer of nuclear assets so that the political leadership can count on its ability to retaliate even if some of the peacetime custodians fail to survive the initial attacks. Equally important, the presence of such a system would ensure that even widely dispersed military operators could execute authentic retaliatory orders despite their lack of personal familiarity with any of the custodians who may be charged with transferring nuclear weapons or their components to these end users in the context of an emergency.\textsuperscript{481} The new unified command headed by the CDS, if established according to expectations, will play a critical role here: It would become the main institution tasked first with overseeing the preparation of all the delivery systems and physical infrastructure that are currently procured, manned, and operated by different armed services; and second with developing all the plans—both current and prospective—pertaining both to conventional joint

\textsuperscript{480} For more on the utility and the dangers of standard operating procedures (SOPs), see Bracken, \textit{The Command and Control of Nuclear Forces}. It should be recognized, however, that the dangers of SOPs to which Bracken refers do not derive from the existence of SOPs per se—which are necessary in all complex organizations—but rather from SOPs that promoted a risk of nuclear inadvertence in the presence of two tightly coupled, opposing nuclear forces. For more on this issue, see Thayer, \textit{“The Risk of Nuclear Inadvertence: A Review Essay,”} pp. 472–479.

\textsuperscript{481} It is in such an environment that technical innovations relating to nuclear safety, such as PALs, secure container systems, and permissive enable systems, would become most relevant.
operations and to the coordination of changing control and custody procedures over nuclear weapon components in an emergency.

Finally, the last and oft-discussed component of an effective national command authority lies in the promulgation of procedures for orderly succession and for the delegation of nuclear release powers in the event of decapitation. As prior analysis has argued, a critical component of India’s force-in-being is its assertive command system. This implies that the authority to unleash nuclear weapons will remain tightly held by the Indian Prime Minister and will not be pre-delegated to any other officials—either civil or military—prior to the outbreak of conflict. Such a system of tight centralization obviously carries with it the risk of strategic decapitation—that is, the possibility that retaliation could be frustrated simply as a result of the early and sudden destruction of legitimate authority. Yet this contingency, however fearsome it may be in theory, is less relevant in India’s case simply because most kinds of nuclear attacks imaginable in this context—whether emanating from China or from Pakistan—would take the form of either strategic signaling or discrete tactical use. Indeed, there are very few contingencies, almost all of them highly improbable, that would require either of Delhi’s adversaries to unleash a surprise “last roll of the dice” nuclear attack on India—clearly the only strategy under which strategic decapitation would appear to be rational. These facts notwithstanding, many Indian commentators have argued that New Delhi should nonetheless prepare for the possibility of strategic decapitation in order to guard against operational surprise.

Such advice, although offered in a cautionary way, is sensible and will probably be accepted by New Delhi as part of its contingency preparations given its claims to nuclear status. Precisely how such

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482 See, for example, Study Recommends Two-Person Rule for Using Nuclear Arms, FBIS-TAC-98-261, September 18, 1998.
484 For a somewhat different view, albeit one grounded entirely in capabilities rather than in strategic judgments, see Menon, A Nuclear Strategy for India, pp. 254-256.
485 Shlapak and Thaler, Back to First Principles, pp. 80-81.
advice is implemented, however, is an entirely different matter. While it is clear that preparing for orderly succession could be exemplified by an act of Parliament transparently specifying in advance the legitimate path for the devolution of nuclear release authority, there is no reason why this procedure should be the only option available to India. To be sure, specifying details about succession through an act of Parliament carries with it an imprimatur that no other mechanism in India’s democratic polity can match. An act of Parliament also imparts the message that New Delhi is cognizant of its obligations as a nuclear weapon state and seeks to discharge those obligations fully and seriously. Full transparency about the chain of succession clearly resolves all the problems of legitimacy that may arise with respect to the question of whether certain political agents are authorized to execute those painful acts which embody grave political and moral repercussions for India. But full transparency in these matters may also be perceived as subversive of security insofar as they might reveal more about India’s nuclear posture and the identity of key decisionmakers than its security managers feel comfortable disclosing.\footnote{Kanwal, “Command and Control of Nuclear Weapons in India,” pp. 1727–1728.}

It is therefore possible that New Delhi will consider one of two other alternatives: (1) to resolve the problem of orderly succession entirely through internal administrative arrangements without any public discussion and with minimal notice, or (2) to employ a mixed solution that involves securing legal authority from Parliament to develop procedures for transferring authority while keeping most of the details relating to that process—and to the offices involved—a state secret. The first alternative obviously does not resolve the problems of legitimacy in any substantive way, although it could satisfy security concerns while ensuring an effective transfer of release authority during a national emergency. The second alternative, in contrast, strikes a better balance inasmuch as it secures many of the benefits pertaining to legitimacy while preserving the security of the succession chain and any other details that Indian policymakers may want to keep under wraps, all without prejudicing the effective devolution of release authority during a crisis.
Irrespective of how this issue is finally resolved, the creation of a succession system itself should not be difficult in a democratic polity like India. As Figure 16 illustrates, India has traditionally had an elaborate "warrant of precedence," and thus developing a suitable system for the devolution of power among a greater or lesser number

| 1. President |
| 2. Vice-President |
| 3. Prime Minister |
| 4. State Governors |
| 5. Former Presidents |
| 6. Deputy Prime Minister |
| 7. Chief Justice |
| Speaker (Lok Sabha) |
| 8. Union Cabinet Ministers |
| State Chief Ministers (w/s) |
| Deputy Chair, Planning Commission |
| Former Prime Ministers |
| Opposition Leaders in Parliament |
| 9. Bharat Ratna recipients |
| 10. Ambassadors, Extraordinary and Plenipotentiary |
| High Commissioners accredited to India |
| 11. Supreme Court Judges |
| 12. Chief Election Commissioner |
| Comptroller and Auditor General |
| 13. Deputy Chair, Rajya Sabha |
| State Deputy Chief Ministers |
| Deputy Speaker, Lok Sabha |
| Members, Planning Commission |
| Union Ministers of State |
| 14. Attorney General |
| Cabinet Secretary |
| Lieutenant Governors (w/t) |
| 15. Military Chiefs of Staff (General) |
| 16. Envoys Extraordinary accredited to India |
| 17. Chair/Speakers of State Legislatures (w/s) |
| 18. State Cabinet Ministers (w/s) |
| Chief Ministers, Union Territories |
| Union Deputy Ministers |
| 19. Officiating Chiefs of Staff (Lieutenant General) |
| 20. Chair, Central Administrative Tribunal |
| Chair, Minorities Commission |
| Chair, SC/ST Commission |
| Chair, Union Public Service Commission |
| Chief Justices, High Court (o/o) |
| Puise Judges, High Court (w/t) |
| 21. State Cabinet Ministers (o/o) |
| Chair and Speakers, State Legislatures (o/o) |
| Chair, MRTP Commission |
| Deputy Chair and Deputy Speakers, State Legislatures (o/o) |
| State Ministers of State (w/s) |
| Ministers, Union Territories |
| Speakers, Legislative Assemblies, Union Territories (w/t) |
| 22. Chief Commissioner, Union Territories (w/t) |
| State Deputy Ministers (w/s) |
| Deputy Speakers, Legislative Assemblies, Union Territories (w/t) |
| 23. Deputy Chair and Deputy Speakers, State Legislatures (o/o) |
| State Ministers of State (o/o) |
| Puise Judges of High Courts (o/o) |
| 24. Members of Parliament |
| 25. State Deputy Ministers (o/o) |

NOTE: w/s = within their states; w/t = within their territories; o/s = outside their states; w/t = within their jurisdictions; o/o = outside their jurisdictions

Figure 16—India’s Warrant of Precedence
of successors should not be inordinately difficult.\footnote{This figure is drawn from “Table of Precedence: Who, Exactly, Is What,” available at http://www.indiavotes.com/reference/who.shtml. Other variations on this table can be found at “Our India: Table of Precedence,” available at http://www.ourindia.com/o2.htm.} Some suggestions as to who should be on this list have already been proffered, mostly by military officers,\footnote{See, for example, Kanwal, “Command and Control of Nuclear Weapons in India,” p. 1727.} but given the pattern of civil-military relations in India, it is most likely that the final succession chain would be biased in favor of civilian rather than military leaders, as appears to be reflected in the warrant of precedence illustrated in this figure. In the United States at least, the succession chain in the event of nuclear attack is composed entirely of civilian leaders even though it is recognized that some individuals might be poorly prepared to exercise such leadership and could be either belatedly or badly connected to the military system in an emergency. Even though “delegation down the military chain of command may [thus] be more effective than the presidential succession proper,” the integration of military leaders into the U.S. succession chain never occurred because “it was widely regarded as highly undesirable, even improper, for political and constitutional reasons and because of the danger of usurpation of the delegated power.”\footnote{Walter Slocombe, “Preplanned Operations,” in Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket (eds.), Managing Nuclear Operations (Washington, D.C.: Brookings, 1987), p. 133.} Given the significance of such concerns in India, it is possible and even likely that New Delhi would simply emulate the American example when devising its own system of devolving command authority for nuclear operations.

A National Security Council. Although the development of a national command authority involves the evolution of procedural systems at the highest levels of state, this development cannot be successful unless it extends to the intermediate echelons of the political structure as well, for it is here that most of the staff work relating to the analysis of policy options is concluded—options that are then transmitted with recommendations to the highest political authorities for final deliberation and sanction. Many of the most important
details relating to the size, structure, and disposition of India’s nuclear deterrent are collected, analyzed, and collated into alternative policy choices at this level, and consequently the quality of the institutional framework at the intermediate levels of governance has an enormous bearing on the kinds of decisions ratified at the political level.\textsuperscript{491} In general, the quality of personnel manning these levels of decisionmaking in India has been high, in large measure because of the extraordinary talent residing in its administrative and foreign services.\textsuperscript{492} Despite this fact, however, national policies have often suffered from considerable incoherence for several reasons: The best and most competent Indian civil servants are still generalists rather than specialists in many issue areas; the organizational structure of their employment binds them to advance the specific interests of their ministries rather than those of the country as a whole; and finally, the coordinating institutions that are supposed to provide an integrated view of various options—based on the expert judgments issuing from different ministries—have never developed into robust centers of competence thanks to budgetary constraints, the constant rotation of personnel, and, on many occasions, confusion between political responsibility and administrative obligations.\textsuperscript{493}

Many distinguished political commentators in India have therefore argued that at least where nuclear issues are concerned, potential lapses in higher decisionmaking can be averted only through the formation of a National Security Council that possesses a permanent secretariat tasked with collecting, analyzing, and disseminating relevant information pertaining to critical national choices.\textsuperscript{494} The development of such an institution along the lines of that in the United States would improve Indian decisionmaking considerably, especially in matters relating to strategic and nuclear issues. Past efforts to create a National Security Council, however, have proved to be ar-

\textsuperscript{491}Kak, “Management of India’s Security and Higher Defence—I,” pp. 334-337.


duous exercises. The first attempts at instituting such a council, for example, foundered in 1990 on the shoals of bureaucratic opposition and political indifference. Several other proposals were then intermittently aired between 1990 and 1998, but none survived to see the light of day.495 In the aftermath of India’s May 1998 nuclear tests, the BJP government set up a task force to recommend a structure for such a council, and although most of the task force’s recommendations were reportedly rejected, a new National Security Council was instituted in late 1998.496

The institution of this new body has, however, been greeted with mixed reviews, with many Indian analyses arguing that its key weaknesses are a product of its organizational structure and of uncertain political commitments to using it effectively.497 As constituted by the Vajpayee government, the National Security Council is essentially a three-tiered organization (see Figure 17). At its core lie the “principals”—namely, the Prime Minister, who chairs a council consisting of the Home, Defence, Finance, and External Affairs Ministers. The Principal Secretary to the Prime Minister—a position usually held by a senior bureaucrat—currently serves as the National Security Adviser, but there is no legal reason a single individual should hold both positions simultaneously in the future. Beneath this committee of principals lies a Secretariat that consists of the chiefs of the independent intelligence services and the heads of the intelligence components of various ministries, the police, paramilitary forces, and various military intelligence directorates. Arrayed on either side of this secretariat in the third tier are two other bodies: (1) the Strategic Policy Group (SPG), which is chaired by the Cabinet Secretary and incorporates the existing “committee of secretaries” composed of senior civil servants overseeing important ministries, with the addition of the heads of the armed services, the DAE and the DRDO, and the Governor of the Reserve Bank of India; and (2) the National Security Advisory Board (NSAB), which is chaired by a Convenor appointed by the government and consists of

495 For a quick review of Indian efforts in this regard, see Amitabh Mattoo, “Counsel for the Defence,” The Telegraph, November 27, 1998.
496 Joshi, “Old Body, New Name.”
nongovernmental experts, academics, journalists, retired civil servants, and retired military officers.\textsuperscript{498}

Each of these two bodies, the SPG and the NSAB, would convene independently to discuss various issues of national importance—often on directive from above—with the aim of channeling advice and recommendations to the National Security Adviser either autonomously or through his Secretariat. These alternatives, after due vetting, would then be passed on to the principals of the National Security Council itself for deliberation and decision. Even if they are not, the products generated by these bodies could still influence policy because their analyses and recommendations would filter to other bureaucratic arms like the Prime Minister’s Office, the secretariats of the various ministries, and the working-level organs of the intelligence and military communities, where they are likely to be used in internal deliberations or absorbed into the policy-option papers prepared by these bodies for the consideration of their superiors. While such an organizational structure thus sounds eminently

\textsuperscript{498}Joshi, “Old Body, New Name.”
sensible in principle, it is not clear whether the new National Security Council in its totality will be effective for the dual purposes for which it is really needed: first, long-range strategic planning, and second, close day-to-day monitoring of the geopolitical and threat environments for purposes of issuing effective strategic warning.

The problems here are legion. To begin with, the three most important bodies that make up the new National Security Council are simply incarnations of existing governmental institutions: The principals of the National Security Council are for all intents and purposes the Cabinet Committee on Political Affairs (now renamed the Cabinet Committee on National Security), except that the former is supposed to exercise deliberative functions in contrast to the latter’s decisional responsibilities, and the SPG is with some modifications primarily the traditional “committee of secretaries” presided over by the cabinet secretary; and the new National Security Council Secretariat is simply the old Joint Intelligence Committee, which now serves as the principal staff of the National Security Adviser. Clearly, all these bodies—being completely immersed in normal administrative chores—are already fully extended by the day-to-day burdens of governance and are therefore unlikely to find the time and energy to engage either in long-range planning or in any lateral, “out-of-the-box” thinking. Recognizing this fact, former Indian Foreign Secretary J. N. Dixit argued that “the council and its secretariat should be mechanisms independent of government departments dealing with day to day security functions and operations. Designating the joint intelligence committee or the defence planning staff as the secretariat for this council will not do. They [already] have their own responsibilities.” Since all the individuals associated with the main governmental constituents of the National Security Council—the principals, the Secretariat, and the SPG—have good access to the internal resources of the state but are overwhelmed by routine political or administrative responsibilities, it is obvious that long-range strategic planning is likely to get short shrift—as has traditionally


500 Joshi, “Old Body, New Name.”

been the case—simply because the key officials capable of undertaking this task lack the time to focus on long-range issues that often are not tractable, lack clear policy solutions, and demand costly initiatives that will seldom bear fruit during their term in office. Not surprisingly, then, when such problems arise, “ad hocist [sic] decision making [becomes] a heady brew and [remains] addictive.”502

The one body that could engage in such activities is the NSAB, since it is composed primarily of individuals who do not have day-to-day responsibilities either in politics or in administration. Since the members of this body either were formerly connected with government (e.g., retired civil servants and retired military officers) or remain involved with the government but are some degrees removed owing to their current occupations (e.g., academics and corporate leaders), the NSAB could in principle undertake long-range strategic planning because it comports, at least in the first instance, with the key functional requirement of having members who are not burdened with onerous political or administrative responsibilities. It is unclear, however, whether the NSAB as it is currently constituted is the best vehicle for this task. This is because its members are not full-time analysts whose services are paid for and secured exclusively by the government but are instead private citizens who have been tasked with pro bono advisory responsibilities in addition to all their many other personal interests and commitments. Unlike the policy-planning staffs in the U.S. Departments of State and Defense—whose members are full-time government employees tasked with doing primarily long-term strategic planning—the NSAB does not consist of a permanent staff of full-time employees dedicated solely to the task of understanding macrostrategic trends and assessing alternative policy options relevant over the longer term. Moreover, many of the members selected during the last two iterations of the board’s existence are not specialists in the truest sense of the term but merely diverse opinion makers of different stripes in national politics.503


It is also unclear, based on past performance, whether this body has had the requisite access to state resources—time, money, and particularly privileged information—that would enable it to support national policymaking in a useful and sustained way. Of the various bodies constituting the present National Security Council, only the principals, the Joint Intelligence Committee that functions as the Secretariat, and members of the SPG have access to classified information that affects policy choices, and it appears that the NSAB corporately has not been given access to this information in connection with its work on nuclear doctrine, the strategic defense review, and defense budgeting. As things currently stand, the requirement for effective long-term strategic assessments thus remains unfulfilled in India, because even the National Security Council body best suited for this purpose continues to be handicapped by various structural limitations. So long as the NSAB essentially consists of part-time outsiders, their analyses will have value primarily as a "sanity check" for India's policymakers and as an additional source of ideas emanating from societal as opposed to state institutions. This contribution is no doubt important, but it still does not represent serious long-term strategic planning of the kind New Delhi needs if it is to avoid—as Sundarji put it—the traditional "lotus-eating approach" that "gave Indian leaders a nice warm glow of righteousness and the country a bogus feeling of importance not based on reality."504

Success in this endeavor is therefore likely to require a full-time National Security Adviser who possesses an integrated staff consisting of civilians and military officers, both generalists and specialists, all of whom are full-time employees of the government, or civilian specialists seconded to the government on dedicated long-term contracts. This staff must, in addition, have access to multiple—including privileged—sources of information, as their principal purpose must not lie in the production of new and original research but rather in the reorganization of existing information in ways that support the creation of better policy choices over the medium to long term. The "option papers" created through this process would then be cycled both formally and informally through the existing bureaucracy and to political decisionmakers, and these products would il-

luminate the long-run consequences of day-to-day decisions while simultaneously shaping the character of current decisions by reference to some desired end state obtaining over the longer term. 505

Many Indian analysts have argued for precisely such a structure, 506 but the present National Security Council is structured in a way that does not make long-term strategic planning possible. This is because the present organization represents a failure of structure in that it commits people to do the work they are already doing while the work yet to be done remains undone. The connectivity of elements like the NSAB, which focus on issues of long-term import, with existing bureaucracies like the Cabinet and Prime Minister’s Secretariat, the Defense Planning Staff, and the perspective planning cells in the various military headquarters, is also low to nonexistent, and the quality of its members is, from the perspective of technical expertise, a mixed bag. On balance, therefore, the NSAB appears to be utterly dependent on the use to which it is put by the National Security Adviser, and by implication its effectiveness is simply hostage to the political weight of the National Security Adviser (and his relationship to the Prime Minister) in national politics. In addition, the National Security Council may embody a failure of commitment to the extent that its legal and constitutional status remains unclear. And since the utility of the National Security Council as a whole continues to depend on the vicissitudes of “process” rather than on the strengths of “structure”—as represented by legislation and previously established practice—even the longevity of the existing structure writ large is an open question. 507 The nature of its relationship with the new bodies currently contemplated in India, such as the National Intelligence Board, the Defence Intelligence Agency, and the unified command to be headed by the CDS, is also still unclear. Such a situation cannot augur well for the development of an effective national command authority, broadly understood.

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507 Thoughtful comments on how some of these challenges may be overcome can be found in K. Subrahmanyam, “National Security Council,” Economic Times, April 2, 1998.
If the institutions for long-range strategic planning thus remain deficient, the capabilities for day-to-day monitoring of the geopolitical and threat environments for purposes of generating effective strategic warning are not particularly effective either. The task of collating all the relevant information necessary for strategic warning ultimately remains the responsibility of the Joint Intelligence Committee (JIC), which is “the highest evaluation agency in India relating to defense and security issues.” 508 The reconstitution of this body into the Secretariat of the new National Security Council should therefore augur well, at least in theory, for the prospect of effective strategic warning. As it is currently constituted, however, this agency is less than adequate to the task. The principal weaknesses of the national security intelligence and warning system in India is not a lack of relevant information at the ministerial, departmental, or agency level but rather the absence of an institution that can harmonize multiple sources of information and conflicting bureaucratic interests to provide an objective assessment of the threat environment at a given point in time.

There are numerous intelligence agencies in India, but three organizations in particular share responsibility for providing information that bears on the country’s ability to generate effective strategic warning: the Research and Analysis Wing (RAW), which is the main collector of external intelligence and remains the primary clandestine operations arm of the state; the Directorate of Military Intelligence (MI), which is the primary collector of tactical and, to a lesser degree, field SIGINT principally for military consumers; and the Central Intelligence Bureau (IB), which is the principal agency overseeing internal security and counterintelligence operations within India. 509 The JIC/National Security Council Secretariat is responsible for obtaining and fusing diverse information from these various sources, analyzing this information and generating assessments, and finally collating its analysis and recommendations into specific policy choices for the consideration of the National Security Adviser, the principals on the National Security Council, or the Cabinet as a whole. As the Kargil crisis amply demonstrated, however, this intelli-

gence and warning system failed completely both strategically and tactically by virtue of the rivalries between the various intelligence organizations, the lack of intelligence sharing both between the various collectors and between the collectors and the JIC/National Security Council Secretariat, the technical inadequacies of the Indian intelligence-collection apparatus, the stunning lack of redundancy in the collection efforts, and the lack of coordination between the various collectors at levels below the JIC. Such a failure would certainly be disastrous in a nuclear environment, since India’s emerging deterrent relies on the expectation of strategic warning for an efficient response even if not entirely for its survivability.\footnote{From Surprise to Reckoning: The Kargil Review Committee Report, pp. 233–238.}

In the aftermath of the Kargil crisis, various proposals have been advanced for improving the collection, coordination, and analysis system with a view toward avoiding a repetition of the numerous intelligence failures that bedeviled India in the past.\footnote{See, for example, Gurmeet Kanwal, “Defence Intelligence,” The Statesman, November 20, 2000; “Defence Intelligence Agency on the Anvil,” The Hindu, October 19, 2000; Shishir Gupta, “National Intelligence Board Mooted,” Hindustan Times, October 1, 2000; and Shishir Gupta, “Plan to Upgrade IAF, Navy, Intelligence Chiefs’ Posts,” Hindustan Times, October 19, 2000.} Yet while many of the technical and some of the organizational solutions presented are likely to be incorporated into the system—if the recent recommendations of the Group of Ministers is any indication—a number of underlying problems relating to the production of effective warning remain. These involve, among other things, the challenges of improving the quality of the personnel involved in the fusion and analysis functions; improving coordination between the Ministries of External Affairs, Home, Defence, and the intelligence services; and developing mechanisms for setting requirements and mandating regular report-back and briefings both to the highest levels of the bureaucracy and to the political leadership.\footnote{From Surprise to Reckoning: The Kargil Review Committee Report, pp. 233–238, and Chari, “India: The Policy Process,” pp. 142–145.}

As more bureaucratic institutions are created to advance national security decisionmaking, however, the task of coordinating these institutions will only grow more complicated. There are already numerous bodies, such as the Cabinet Secretariat, the National Security...
Council Secretariat, and the Strategic Policy Group—not to mention the relevant ministries—that contribute in some way to the production of strategic warning. These institutions will probably be augmented in the future by additional organizations such as the National Intelligence Board and the Defence Intelligence Agency. Coordinating the activities of all these bodies within the framework of the existing cabinet system is likely to become a demanding task. The Cabinet Secretariat traditionally performed all the myriad tasks connected with coordinating the intelligence and warning process. In addition to all the other routine chores of maintaining records, minutes of meetings, and the like, it also performed the function of clarifying the import of national security decisions made by the Cabinet and translating the same into actionable tasks for all the relevant governmental agencies. Yet while these routine functions have remained unchanged, the critical role the Secretariat historically played—that of reconciling ministerial recommendations, flagging key issues for adjudication and decision by the political leadership, and presenting evaluated intelligence information for strategic decisions—has slowly been usurped by the Prime Minister’s Office as part of the steady transfer of power from the Cabinet to the Prime Minister. While such a migration might have been quite tolerable in other circumstances, there is no evidence that the growing concentration of power in the Prime Minister’s Office has resulted in the capacity for more effective intelligence and warning in the national security arena. On the contrary, it appears to have generated a widespread perception that decisionmaking in this area and elsewhere has been overly “ politicized” because the Prime Minister’s Office has in fact become “a parallel center of power at the cost of the institution of the Cabinet.”\textsuperscript{513} Complicating matters further is the fact that the burdens of managing a complex polity like India have led the bulk of the Prime Minister’s Office time, resources, and assets to be consumed by the demands of domestic politics rather than by matters of national security. The Indian state thus appears to have garnered the worst of both worlds: The institution most capable of managing its intelligence and warning process—the Cabinet Secretariat—has experienced a steady diminution in power, effectiveness, and prestige, while the most powerful bureaucratic institution

\textsuperscript{513}Cited in Panandiker and Mehra, \textit{The Indian Cabinet}, p. 229.
within the government today—the Prime Minister's Office—finds itself overextended and incapable of controlling the intelligence and warning process with the diligence required in a nuclear weapon state. Only time will tell whether the several new bodies now being set up to assist in the production of better strategic warning will be successful in correcting this problem.

In any event, if these problems are not rectified, India is likely to find itself in the distinctly unwelcome position of having less-than-effective policymaking institutions where both long-range and near-term strategic challenges are concerned.

**Better Civil-Military Coordination.** While the National Command Authority and National Security Council represent critical procedural systems at the highest and intermediate levels of state, respectively, the sound management of India's evolving nuclear capabilities also requires good procedural systems at the lower levels of its regulatory structure—and among the most important innovations needed here lies in the improvement of civil-military coordination, which in turn involves several interrelated issues. Clearly there is a need for better overall civil-military coordination within the Indian state. The world was once again reminded of the parlous condition of this relationship when in 1999 India's top political leadership summarily dismissed Chief of Naval Staff Admiral Vishnu Bhagwat for a variety of reasons, including the "defiance of civilian authority." In the aftermath of this incident, the Indian Defence Minister initiated a review of possible reforms in the higher defense decisionmaking apparatus, and numerous Indian commentators—as well as the three uniformed services—proffered various suggestions in this connection.

Most of the discussions prompted by this debate have focused on creating a new Chief of Defence Staff to be held in rotation by the three services; the integration of the service headquarters with the

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514 The details of this extraordinary episode can be found in Prabhu Chawla and Manoj Joshi, "Sunk!" *India Today*, January 11, 1999.

Ministry of Defence; the creation of a new “Procurement Executive” to oversee weapon selection and purchase negotiations; the development of a new Defence Management Service; better integration between the Ministries of Defence and Finance; increased autonomy for the service chiefs in matters of lower-level promotions; the resuscitation of the Defence Minister’s Committee; and the creation of new integrated theater commands.\footnote{These proposals have been summarized from Suba Chandran, “Integration of Defence Apparatus,” report of an IPCS seminar held on January 22, 1999, available at http://www.ipcs.org/issues/articles/711-md1-suba.htm; Charli, “Needed Radical Restructuring of the Defense Apparatus”; Subrahmanyam, “Restructuring Ministry of Defence”; P. K. Vasudeva, “The Army Will Not Take Over,” The Hindu, February 16, 1999; and Mehta, “Need to Involve Services in Decision-Making Stressed.”} All these recommendations represent sensible, and perhaps long-overdue, innovations that are no doubt necessary for better defense management, and, not surprisingly, the Group of Ministers has already accepted many of these ideas. Yet at the same time, it is unlikely that they will by themselves lead to more effective control of India’s evolving nuclear capability. This is because the relationship between competent higher defense institutions and coherence in nuclear planning, management, and operations has traditionally been indirect in India’s case, because New Delhi’s nuclear capabilities have historically been developed and nurtured outside the bureaucratic control of the uniformed military. Therefore, any effort to improve the management of nuclear forces cannot rely on the indirect benefits accruing from defense institutional reform but must instead focus on the specific civil-military issues that directly affect the deterrent.

It is likely that these improvements will manifest themselves in three distinct ways over time. The first and most significant manifestation of improved civil-military coordination will center on involving one or more of the relevant service chiefs and their staffs in formal planning pertaining to India’s nuclear capabilities.\footnote{See Joesck, Maintaining Nuclear Stability in South Asia, pp. 52–54.} As Major General D. K. Palit noted, the “Chiefs of Staff—however relegated to the wings they might have been in the past in matters of national security formulation—will now have to be drawn into the deliberations of policy-making bodies in order to make their due contributions to
nuclear war planning. If past practices are any guide, this involvement could remain secret, although it is likely that such consultations will become routine, systematic, and wide-ranging over time. India’s Chief of Air Staff is already believed to be part of the informal nuclear policy planning group within the government and that role will likely be extended to the other service chiefs in time. Integrated planning and consultation with the leadership of the armed services do not, however, translate into military command, control, or custody of India’s nuclear assets. India’s civilian security managers are anxious to safeguard their jurisdiction in all three issue areas, in part to drive home the point—both within the country and abroad—that India’s nuclear weapons are not instruments usable for war fighting but merely national assets against political blackmail. Consistent with this view, even the prospective unified command that could be headed by the CDS will not acquire any command, control, or custody over nuclear weapon components in peacetime. This means that civilian custodians will maintain the fissile cores and possibly the weapon assemblies routinely. These new organizational structures would, however, provide a formal mechanism through which the higher military leadership could contribute to the management of India’s nuclear deterrent in three ways: first, by providing military advice with respect to strategic requirements in order to guide the research, development, and acquisition of nuclear weapons, delivery systems, and supporting infrastructure assets; second, by overseeing the development of nuclear targeting and weapon employment plans under civilian guidance; and third, by developing and systematizing all the plans and procedures required to effectively integrate India’s distributed strategic capabilities under different threat conditions. Obviously, these activities have been under way for a while, but thus far they were carried out primarily through informal means. By contrast, the new institutional arrangements—if they come to fruition in the best imaginable forms—would allow both the CDS and the three service chiefs more direct access to the highest political authorities as part of the reorganization of the

519 Sawhney, “To Test or Not to Test: The Challenge for India’s Nuclear Credibility,” p. 32.
Ministry of Defence. From a strictly operational point of view, the formal integration of India’s military headquarters with its Ministry of Defence may therefore be unnecessary—at least as far as effective nuclear operations are concerned. This integration may be desirable on other grounds, but so long as India’s civilian leaders create structured opportunities for the service chiefs to express their recommendations about the design, organization, and requirements of the country’s nuclear forces (while simultaneously requiring them to plan all the details connected with the integration and employment of these forces in an emergency), they can continue to derive all the benefits of professional military advice without risking any of the liabilities they fear might arise if the uniformed military were to be formally integrated into the functions of nuclear command.

For this system to work, however, there must be systematic opportunities for consultation about nuclear issues. The CDS must secure ready access to the national leadership in order to receive authoritative guidance and political endorsement of his plans, and he should be able to levy demands on the other service chiefs, since the latter are expected to remain the operational commanders possessing day-to-day control over all conventional military forces for at least the next five years. Negotiating this division of authority and finalizing the plans that regulate the detachment of various assets to the new CDS and to the new unified command that might be created will require much work and goodwill. These challenges will not be trivial because the operational command over India’s nuclear delivery systems—which might be ceded to the CDS as per the recent recommendations of the Group of Ministers—could collide with the operational responsibilities of the existing service chiefs because many of India’s delivery systems and almost all of its supporting infrastructure will remain, at least in the near term, essentially dual-capable assets that are already committed to conventional operations. The

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521 For more on this, see Bhimaya, “Nuclear Deterrence in South Asia,” p. 649ff. As D. K. Palit also acknowledges, India’s national leadership would prefer to keep its nuclear weaponry outside of the custody and control of the uniformed military but, this fact notwithstanding, correctly argues that New Delhi would still have to adapt existing strategic institutions to ensure properly coordinated responses in the event of conflict. See Palit, “War in the Deterrent Age,” p. 22ff.
CDS will also require substantial access to information about New Delhi’s nuclear capabilities. India’s nuclear scientists and defense technologists traditionally held this information closely, but it will now have to be more widely shared if the new unified command is to prepare a variety of "rolling" plans for nuclear operations—plans that either augment or replace those already believed to have been drawn up by the Indian Air Force.⁵²² Amid all these discussions about reorganization, however, it is important to remember that the instructions to specific commanders to prepare certain units for nuclear operations are almost certain to have been transmitted by now, if only informally, through the Chief of Air Staff. The need for specific equipment, resources, training, and support to carry out these missions is also likely to have been informally communicated to the relevant civilian authorities: What remains to be done is mainly to systematize existing plans and prepare for the induction of other, more capable technologies that will be available in larger numbers and that may require different readiness levels, basing modes, custodial arrangements, and organizational controls in the future. There already exists an established procedure centered on the creation of GSQRs for this purpose, and it is likely that some variant of this process will be progressively applied to nuclear-related requirements over time.⁵²³ This cyclic process will require steady consultations between the relevant military institutions and their civilian masters even if the former are asked to independently prepare for such operations with their own resources and without any fanfare. In any event, high-level coordination between the uniformed military—personified by the CDS, the service chiefs, and their selected staffs—and the civilian authorities, both in the leadership and in the nuclear and defense research-and-development communities, will grow as the force-in-being is operationalized over time.⁵²⁴

The second significant manifestation of improved civil-military coordination will be improved coordination between the DAE, the DRDO, and uniformed services at the working level. As the previous discussion indicated, the responsibility for creating a nuclear deter-

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⁵²² See "IAF Draws Up Nuclear Strategy."
⁵²³ See, for example, Menon, A Nuclear Strategy For India, pp. 241–260.
⁵²⁴ For Indian complaints that this is still not occurring as rapidly as it should, see "Is India a N-Weapon State?" The Hindu, October 1, 2000.
rent historically was borne primarily by civilian institutions, with formal military involvement occurring mainly at the tail end of the process. This unique division of labor is now likely to be tweaked in ways that allow for enhanced military participation in what were previously nontraditional areas of presence. Such participation, again, may not be organized in the near term through specialized bureaucratic devices such as offices, titles, and budgets, but it will occur under the aegis of the CDS in at least four issue areas of importance to the future force-in-being: assessing force-structure requirements; analysis in support of R&D efforts and acquisitions; operations research in support of deployment postures; and testing and integration of systems. In each of these issue areas, the potential contributions of the military will spell the difference between symbolic and effective nuclear capabilities.

Under the aegis of the CDS in particular, it is likely that these four issue areas will receive increased attention. The analysis in support of this work may initially be conducted through informal networks, but it should not be surprising to find officers such as the Vice-Chief of Defense Staff and his deputies increasingly directing, if not entirely absorbing, the efforts already made in this regard by small existing “shops” within the Ministry of Defence (particularly the DRDO) and at the service headquarters. This involvement will mainly regulate the activities of staff officers and technical specialists who perform the bulk of the analysis. The results of such analysis, in turn, will inform the conclusions of senior officers and officials from different agencies—conclusions that will then lead to the drafting of internal papers and, thereafter, to specific decisions following approval by the country’s political leadership.

While this is likely to be the modus operandi on all matters requiring analysis prior to the generation of specific development or ac-

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525 The uniqueness of India’s traditional arrangements when viewed from a comparative perspective is reviewed in Perkovich, *India’s Nuclear Bomb*, pp. 444–464.

526 At a more supervisory level, it is almost certain that officials from the Prime Minister’s Office and the Ministry of External Affairs will also play a critical role in this process as will a small host of other individuals who, despite not holding any identifiable offices, will nonetheless contribute ideas, suggestions, and judgments through their close connections with key individuals in power. A Joint Secretary from the Ministry of External Affairs, for example, will be assigned to the office of the CDS.
quisition decisions, only a slightly modified procedure would obtain in the case of executing decisions already made; the testing and integration of specific weapon systems, for example, would be completed through the interaction of a small number of individuals—civilian and military—with minimal bureaucratic procedures. The objective in all instances would be to complete the task at hand with minimal visibility, minimal employment of resources, and minimal alteration of preexisting patterns of activity. Obviously, it is possible that shifting to some alternative procedures that are more visible would make for a better deterrent. Whether or not this is true, however, New Delhi’s desire to possess a minimum deterrent, but not one at any price, is likely to ensure that it will focus on developing such a capability with minimal disruption of the existing patterns of civil-military relations, and there is no reason in principle why it cannot succeed in this endeavor. So long as civil-military coordination under the aegis of the CDS is ongoing, systematic, and productive, New Delhi will be able to enjoy the best of both worlds: to develop a force-in-being that comports with some desirable standards of operational utility even if it restricts the military’s role in the control of those activities leading up to the creation of such a capability.  

The third and final manifestation of improved civil-military coordination will be the development of standard operating procedures relating to the management of nuclear missions in an emergency. As the command system described in the previous chapter suggested, the baseline model of command envisages significant military contributions in an operational sense primarily in the aftermath of a deterrence breakdown. Prior to a deterrence breakdown, the primary operational role of the Indian military consists of maintain-

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527 It is important to recognize that this conclusion implies that the Indian military is already—even before the creation of the CDS—involved in various matters pertaining to the operation of the country’s nuclear deterrent even if these forms of involvement may not comport with the traditional patterns witnessed in the history of previous nuclear powers. Further, the creation of the CDS only suggests that as India’s nuclear capabilities increase in size, diversity, and complexity, the currently informal networks responsible for planning and coordination in the nuclear operations realm will slowly mutate into more institutionalized structures that are dedicated to these tasks, even if their more remote offices or agencies are not overtly identifiable.

ing delivery systems in custody either at various levels of alert or in
inactive status; practicing for nuclear missions, perhaps without ac-
tual weapons themselves; and systematically preparing for nuclear
operations. After a deterrence breakdown has occurred and the de-
cision to retaliate has been made by civilian authorities, the opera-
tional contributions of the uniformed military rise steeply as they
begin to assist in the integration of relatively dispersed strategic
components prior to the actual delivery of nuclear weapons against
an adversary’s targets. In order to make the response system associ-
ated with both this baseline and other alternative models of com-
mand viable, a significant amount of civil-military coordination in
peacetime is necessary—and again, while this coordination does not
have to be visible in the first instance, it does have to be systematic,
preplanned, and coherent. In fact, it is all but inevitable that those
procedures developed for this purpose in the past will be increas-
ingly systematized in the form of standard operating procedures that
may or may not take the form of doctrinal manuals but will in any
case be comprehensive enough to allow all the relevant custodians of
India’s emerging nuclear assets to undertake the preplanned primary
and alternate procedures for pre- or postattack reconstitution and
response.529

Systematizing the plans required to support such a response sys-
tem as India’s nuclear assets grow in numbers, diversity, and com-
plexity represents the essence of nuclear operations, and because the
Indian force-in-being will be characterized by both a distributed de-
ployment posture and an assertive command system in peacetime,
the demands on civil-military coordination in preparing viable plans
will be significant. To be sure, some issues—such as personnel reli-
ability programs, ensuring physical security of components, and
procedures for crisis relocation—can be independently managed by
the various custodial agencies. Numerous other challenges, how-
ever—such as planning for effective targeting, developing appro-
appropriate authentication procedures, disseminating fallback plans in
an emergency, and devising easily understood procedures for pre-
or postattack coordination, assembly, and reconstitution of forces—will
require extensive peacetime coordination between civilian and mili-

529 “IAF Draws Up Nuclear Strategy” and “IAF Suggests Nuclear Air Command,”
tary planning staffs. To the degree that such activities—which have already begun in India—are completed successfully as the country's nuclear capabilities grow in size and diversity, New Delhi will have a minimal set of procedural systems that will allow it to control its nuclear arsenal effectively in the event of a deterrence breakdown. The prospective appointment of the CDS and the likely creation of a unified command in the future are in fact designed to bequeath to India just this capability.

The discussion of procedural systems conducted here suggests that managing a nuclear force is a complex activity that spans many dimensions ranging from the design of that force to its production and deployment to its possible use. Each of these stages requires various organizational and regulatory mechanisms throughout the political system: At the highest levels, an effective National Command Authority plays a critical role in defining both the country's grand strategy and the purpose of nuclear capabilities in servicing that strategy while serving as the only agency that can legitimately authorize the use of nuclear weapons when such is required. At the intermediate level, an institution like the National Security Council (among others) could prove useful in fusing information, analyzing issues, and preparing alternatives for the consideration of senior policymakers with respect to nuclear capabilities, among other strategic issues, and in generating strategic warning. Finally, at more lower levels, the coordination of civil-military expertise would play a vital role in ensuring that specific policy choices are translated into the minutiae critical for orderly operations both in peacetime and during an emergency. Obviously, this list of desirable procedural systems does not in any way exhaust the list of organizational desiderata necessary for a safe and effective nuclear deterrent. Many of these micromechanisms will be identified only as the Indian force-in-being develops over time. All that can be done here is to focus on certain critical macrovariables that affect the prospect that these micromechanisms will be developed as time passes. When the record pertaining to the development of these procedural systems is reviewed, the evidence suggests that although India has made a start in developing some capabilities, it still has a long way to go before the organizational mechanisms that regulate its nuclear deterrent are judged to be comprehensive, effective, and complete, especially
when the potential growth in the size, diversity, and complexity of India's evolving arsenal is taken into account.

**MEETING THE DEMANDS OF SUCCESSFUL DETERRENCE**

The analysis of capabilities undertaken in this chapter clearly demonstrates that India's claims to being a nuclear weapon state are somewhat overstated, since India continues to lack many of the components associated with a nuclear deterrent irrespective of how that deterrent is configured. At this point in time, New Delhi appears to have a small quantity of fissile materials, primarily weapons-grade plutonium, that continues to be accumulated at a relatively slow but increasing pace; a small number of nuclear weapons, which by most accounts are maintained in unassembled form; a small number of delivery systems consisting primarily of short-range tactical strike aircraft, some of which have been modified for the nuclear strike mission; an embryonic supporting infrastructure that includes many elements originally intended for the sustenance of conventional military operations, but with some other components either absent or available only in notional form; and modest procedural systems that are still more consistent with India's previous posture of "maintaining the option" than with its new desire for a "force-in-being." Given these generally limited capabilities, the assertion that India is now a nuclear weapon state\(^{530}\) must be interpreted more as a symbolic challenge to the existing global nuclear regime than as an accurate descriptor of the country's present strategic capabilities.

Many of these weaknesses will no doubt be remedied over time. If India's security managers continue to develop its nuclear capabilities with the same resolve the BJP government demonstrated in 1998, the country could well have—as Table 5 indicates—all the essential elements its force-in-being requires over the next two decades.

Even when this process is completed, however, India will possess—at least according to its current plans—a fairly modest nuclear arsenal that will serve mainly to allow for simple forms of retaliation while minimizing the peacetime risks associated with the possession of such weaponry. In fact, maintaining a deterrent in the form of a

Table 5

Time Frame Governing Development of India’s Force-in-Being

<table>
<thead>
<tr>
<th>Component</th>
<th>Near Term (-5 Years)</th>
<th>Medium Term (-5–10 Years)</th>
<th>Long Term (-10–20 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nuclear weapons</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produce fissile materials</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
</tr>
<tr>
<td>Improve nuclear weapon designs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Delivery systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify strike aircraft</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Procure nuclear SRBMs</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Procure nuclear IRBMs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Procure nuclear ICBMs</td>
<td>?</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Procure surface combatants with N-SLBM/CMs³</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Procure SSBNs with N-SLBM/CMs</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Upgrade physical infrastructure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Supporting infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop command posts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Improve communications systems</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Develop warning and assessment sensors</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Incorporate thin strategic defenses</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Procedural systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutionalize National Command Authority</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Consolidate National Security Council</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Improve joint civil-military coordination</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

³N = nuclear; CM = cruise missile.

force-in-being trades wartime effectiveness for enhanced peacetime
safety and security, and Indian policymakers appear quite comfortable
with such a compromise because they view their nuclear weapons primarily as political instruments intended to promote
caution in the minds of their adversaries—while bolstering their own
self-confidence—rather than as true weapons of war that are likely to
see extensive use in the Indian subcontinent. Since New Delhi is optimistic about the low prospects of nuclear use, it is not surprising to find—as Figure 18 depicts—that its force-in-being is almost by its very nature biased in the direction of negative as opposed to positive control. In fact, the analysis that follows suggests that the force-in-being may be able to meet many of the criteria for a good deterrent precisely because it is configured along conservative lines that emphasize safety even as it seeks to fulfill the strategic purposes for which it is being acquired.

![Figure 18—The Relative Vulnerability of India’s Nuclear Arsenal](image)

**Prelaunch Systems Integrity.** Any complicated system like a nuclear deterrent consists of a number of complex parts, all of which must function flawlessly if the deterrent is to perform as required. A

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ready arsenal, for example, benefits greatly from the fact that all of its component systems are deployed and maintained in the same physical and operational environments that surround them during actual use: Weapons are mated to launchers; launchers are integrated to physical controls and diagnostic systems; and the entire apparatus is tested and deployed in a context as close to operational conditions as possible. The Indian force-in-being, in contrast, may not enjoy many of the benefits that accrue from advance physical integration and maintenance at high levels of readiness: Components of warheads may be separated from one another; weapons are likely to be separated from delivery platforms and launchers; and missiles may be further separated from their TELs and diagnostic equipment. Many of these limitations can be overcome through repeated testing of components in different environments and through the constant maintenance of such components at high standards. However, because intricate technologies often interact in unanticipated ways, there is always some likelihood that a dispersed system—when brought together—may experience a higher failure rate than other routinely integrated systems.

Indian weapon technologists are well aware of this problem, as are their civilian masters; indeed, the former often distinguish between having "confidence" in the performance of a system and providing full "assurance" that the system will always work as intended. While rigorous testing at the component and subcomponent level is seen as providing confidence that India’s deterrent will work when required, Indian technologists recognize that they cannot offer policymakers any unconditional assurance about their products’ performance because political constraints and operational practices often conspire to prevent them from conducting the kinds of tests that would allow them to do so. These concerns are often voiced with regard to nuclear weapons themselves, given New Delhi’s self-

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535 For a good statement about Indian concerns relating to this issue, see Karnad, "A Sucker’s Payoff," pp. 46–47.

536 I am grateful to K. Santhanam, Chief Adviser (Technologies), DRDO, for discussing the implications of this distinction with me from an operational perspective. See also Sundarji, "Indian Nuclear Doctrine—II: Sino-Indo-Pak Triangle," for additional remarks on this issue.
imposed moratorium on further testing, Indian policymakers counter, however, that while further full-up tests may in fact contribute to the quality of their deterrent, such tests may not be necessary for deterrence stability, since India’s adversaries cannot count on the technical imperfections of its force-in-being to provide them with the immunity they need to prosecute successful acts of aggression against India given the horrendous consequences they would face if those expectations turned out to be false in a crisis situation.\footnote{537} Put another way, Indian policymakers today appear to recognize that their force-in-being as a whole may exhibit poorer systems integrity than some other conceivable variant, such as a ready arsenal, but they nonetheless believe that securing other important political objectives makes the possession of such a deterrent well worth the risk.

**Postattack Responsiveness.** While the conclusion that the Indian force-in-being is likely to display a bias toward poorer rather than greater systems integrity is easy to draw simply on the basis of its inherent characteristics, the quality of its retaliatory effectiveness in the postattack stage is more difficult to assess because this variable is critically influenced by the size and efficiency of an adversary’s attack. A large attack conducted with scores of high-yield warheads could incapacitate India in ways lying beyond the scope of the imagination; even if these attacks did not succeed in interdicting the critical components of the deterrent per se, they could destroy the national infrastructure and the organizational structure of the Indian state to a sufficient extent to preclude any effective retaliation.\footnote{538} If, on the other hand, the attacks on India were either symbolic or modest, the Indian force-in-being should be able to reconstitute and respond effectively. The depiction of bias in Figure 18 is therefore appropriately ambivalent, since both the degree and the coherence of the force-in-being’s postattack responsiveness depend in large measure on what India’s adversaries do to it in the context of conflict. Despite this ambivalent characterization, Indian policymakers—as noted before—are not unduly troubled by the prospect of poor

\footnote{537}The clearest statement of this position can be found in Sundarji, “Changing Military Equations in Asia: The Role of Nuclear Weapons,” pp. 134–135.

\footnote{538}For a pessimistic view of this problem, see Jones, *From Testing to Deploying Nuclear Forces*, p. 6.
postattack responsiveness because they believe that nuclear weapons per se have sufficient dissuasive power to prevent any adversary from testing fate in the face of their awesome capabilities.539

This sanguine attitude notwithstanding, it is important to recognize that the issue of postattack responsiveness is critically influenced by the degree of opacity surrounding the Indian deterrent. The success with which New Delhi is able to mask the size, location, and disposition of its nuclear assets in peacetime and the rapidity with which it can disperse these assets in a crisis will be the most critical variables determining whether an adversary’s attack is easy or difficult, small or large. If India’s competitors are able to render the country’s nuclear posture transparent by some means of intelligence, they could at least in theory disarm India by mounting focused attacks in the context of a crisis. The decision to launch such focused attacks could be rationalized as a form of preemptive defense were an adversary to reason that initiating nuclear war left it better off than taking its chances with an unstable peace. Successful opacity maintained under all circumstances, on the other hand, would undermine this calculus by forcing an adversary to confront the prospect of an unsuccessful attack and compelling it to launch a much larger strike than would otherwise be necessary, in the process raising two critical issues that could make the difference to India’s safety: First, does the adversary possess the number and kinds of weapons capable of interdicting the huge target set that must necessarily be destroyed if it is to minimize the prospect of a successful Indian counteraction? And second, given the competing interests that any adversary tasked with making this decision would face, are the political goals in dispute worth the expenditure of such massive—as opposed to limited—levels of force? Successful opacity in effect holds the key to Indian security—for insofar as it requires India’s adversaries to mount much larger nuclear attacks than would otherwise be the case, these attacks become increasingly disproportionate to the political issues in dispute and, as a result, become less probable as well. This beneficial outcome, then, only redounds to India’s advantage where postattack responsiveness is concerned.

Unauthorized Use. Among the major concerns historically associated with the presence of nuclear weapons has been the fear that their enormous power might be unleashed by agents not authorized by the state; it is hypothesized that such misuse might result either because the custodians who physically possess these weapons chose (or threatened) to use them in the absence of an explicit command from state managers or because the physical control of the devices might be usurped by entities that are not organizationally part of the state. 540 The desire to avert such problems during the Cold War led to the development of both technological solutions such as PALS and organizational solutions such as the two-man rule—measures that may eventually be incorporated in some form into the Indian nuclear arsenal as well. At the same time, however, the currently anticipated configuration of India’s force-in-being makes it highly resistant to unauthorized use, in large part because it ensures that no completed nuclear weapons will exist in peacetime or at least prior to any official directive to integrate separated components into completed weaponry. 541 Since India’s nuclear reserves in their “normal” status would thus take the form of separated components, the problem of unauthorized use would be minimized because illegitimate entities would face the onerous task of locating, identifying, recovering, and reconstituting the separate, secretly stowed components into completed devices. Orchestrating this process would therefore require assistance from individuals associated with the weapon program and might in fact require many custodians—possibly from several different organizations who may not know one another personally—to conspire to fabricate such a device. Alternatively, it would require that a device somehow fall into the wrong hands after it had been legitimately reconstituted on receipt of a proper directive from the national command authority.

It is extremely unlikely that either of these contingencies could occur given the organizational structure of India’s strategic enclaves. Covertly reconstituting completed nuclear weapons, for example,

540 For a good review of the numerous issues related to this problem, see Paul Leventhal and Yonah Alexander (eds.), Preventing Nuclear Terrorism (Lexington, KY: Lexington Books, 1987).

541 This statement obviously does not apply to devices reconstituted for experimental or testing purposes.
would be extremely difficult by virtue of the relatively large number of individuals required for such an operation. Moreover, if such devices were to be used (as opposed to being merely reconstituted) in any politically significant way, the burden of carrying out this operation would be further magnified, since it would require the acquiescence if not the cooperation of a wide variety of individuals ranging from scientists and technologists to armed guards and truck drivers. Because the organizational demands associated with hatching such a conspiracy and carrying it to a successful conclusion are so great, it is highly improbable that the Indian force-in-being would be subjected to the threat of unauthorized reconstitution of its weaponry leading to some form of use—unless it is assumed that a significant portion of India’s strategic enclaves would for some reason elect to rebel against the state. While such an outcome is possible in theory, there is no reason to believe that it is likely.

Nor is the second contingency—properly reconstituted weapons falling into the wrong hands—a plausible outcome. If the country’s evolving doctrine serves as any indication, India’s nuclear weapons would be reconstituted primarily in the aftermath of a nuclear attack—and in such circumstances reconstitution, being merely a prelude to retaliation, would present minimal opportunity for any loss of such devices, since the time that would elapse between reconstitution and use would be quite short. It is also likely that the assembly areas where final integration of weapon components takes place would be in close proximity to the location where delivery operations are initiated. Even if Indian nuclear weapons are reconstituted on strategic warning as a prudent measure—prior to any attack on India—these weapons may not be delivered to their final operators—the uniformed military—except prior to authorized use. Moreover, even if they were delivered prior to authorized use, the risk involved would be minimal because the Indian military’s past record of loyalty to the state is exemplary despite its modest status in the national hierarchies of prestige and power. Shekhar Gupta captured both of these dimensions succinctly when he noted that “in no other major democracy are the armed services given so insignificant a role in policymaking as in India. [Yet] in no other country do they accept it with the docility they do in India.”\(^542\) Consequently, even if

completed nuclear weapons are transferred to the uniformed military in the context of a crisis, the ingrained loyalty of the armed services, combined with specific organizational safeguards designed for just such an eventuality, ought to suffice to prevent unauthorized use. Therefore, irrespective of the specific sequences followed in connection with the processes of reconstitution, it is almost certain that India will use a combination of secrecy, enhanced security arrangements, and physical safety devices to prevent any entities—including the uniformed military—from acquiring material custody of completed weapons ahead of the time deemed appropriate by civilian authorities. The same safeguards should also suffice to prevent unauthorized entities from securing access to any completed nuclear weapons.

None of these intrinsic safeguards prevents Indian security managers from developing additional solutions to the already-manageable challenge of unauthorized use. While most solutions suggested in the Western literature gravitate toward the development of advanced mechanical safeguards such as PALs, numerous additional measures could be instituted at relatively low cost. Given the structure of the force-in-being, the most effective measure in all such instances would lie in further strengthening the strong sense of identification with national purpose that already prevails within India’s strategic enclaves. This solution, which the Indian state has in fact adopted since its independence, in itself minimizes the possibility of unauthorized use, since it further diminishes the already-minuscule incentive for organized revolt. Beyond reliance on loyalty, however, the Indian state has many other bureaucratic tools at its disposal to increase safety. The local Criminal Investigation Department (CID) and the Intelligence Bureau, for example, already perform background checks of all personnel assigned to security duties in sensitive locations. And while there is little that would prevent these ac-

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543 Chengappa, *Weapons of Peace*, pp. 437–438, suggests that during the Kargil crisis, for example, DRDO custodians, maintaining physical custody of the warheads at all times, in fact “headed to where the Prithvi missiles were deployed,” as four of these systems were allegedly being “readied for a possible nuclear strike.”

544 See Abraham, *The Making of the Indian Atomic Bomb: Science, Secrecy and the Post-Colonial State*, for an excellent discussion of how this solution was operationalized in India.

545 Kasturi, *Intelligence Services: Analysis, Organization and Functions*, p. 64.
tivities from being extended to many more individuals associated with the force-in-being, these efforts may actually prove unnecessary, since both the DAE/DRDO and the uniformed military already have their own versions of a "personnel reliability program" that, by incorporating both informal and formal reviews, have thus far been remarkably effective. There is no reason, however, why the internal surveillance responsibilities borne by these institutions, together with others like the Intelligence Bureau and the Central Bureau of Investigation, cannot be expanded so that any individuals confronted by suspicious or unexplained occurrences within their programs have access to institutionalized means of reporting potential challenges to state authorities.

**Mistaken Authorized Use.** While the Indian force-in-being is thus highly resistant to unauthorized use in both structure and practice, it is even more strongly biased against the possibility of mistaken authorized use. To be sure, the potential for mistaken authorized use generally inheres in a nuclear posture designed for the conduct of prompt operations. Specifically, when nuclear weapons are already in the custody of the end user, when predelegated authority to use such weapons is disseminated to lower echelons of the command chain, and when nuclear operations are designed to be initiated on receipt of either strategic or tactical warning of attack, the potential for mistaken authorized use is by definition relatively high because such weapons might have to be launched despite the possibility that the indicators of incipient attack might ultimately turn out to be false.\(^{546}\) The use of nuclear weapons in such instances would certainly be legitimate in that it would not contravene any standing orders custodians might have with respect to initiating nuclear operations in an emergency, and it would also be legitimate if the national command authority authorized nuclear release in situations where it genuinely believed that the country was under attack by virtue of "false positives" emerging from the sensors and early-warning system. During the Cold War, the United States sought to minimize the prospect of mistaken authorized use by requiring that positive confirmation of incipient attacks be derived from multiple sensors. In the later years of the Cold War, it used sensors with "dual phe-

nomenology so that all tactical warning indicators that could lead to the generation of heightened stages of alert and possibly to nuclear responses would be corroborated by separate detection systems that observed different physical signatures.

The Indian force-in-being resolves the problem of mistaken authorized use not so much through technical solutions as through organizational and doctrinal remedies. The most important safeguards here are India’s commitment to a no-first-use policy and its refusal to allow the ultimate end user—the uniformed military—to maintain custody of completed nuclear weapons in peacetime. This no-first-use policy—which is more durable than Soviet variants of the same for all the reasons explicated in the previous chapter—effectively ensures that the Indian military will be unable to execute retaliation except in the aftermath of a nuclear attack. Only when such an attack takes place—and when these attacks are physically verified by multiple forms of reporting—would India’s nuclear reserves be reconstituted into an arsenal for purposes of retaliation. Even if reconstitution itself does take place prior to nuclear attacks on India, retaliatory responses will certainly be delayed until information about the attacks is physically verified by multiple means. The dispersed posture of the force-in-being—together with the fact that important components are routinely maintained by organizations other than the uniformed military—implies that India’s nuclear assets cannot be mistakenly used merely on receipt of tactical warning. It is in fact likely that at least in the near term, India will possess only thin tactical warning capabilities simply because it does not require any thick capabilities for the survivability of its deterrent: The operational doctrine of “delayed—but assured—retaliation” can be effectively executed without any tactical warning systems whatsoever and the doctrine’s emphasis on delayed retaliation only implies that the kinds of hair-trigger response postures that increase the likelihood of mistaken authorized use can be avoided altogether. All these factors taken together suggest that the first notice Indian policymakers are likely to have of a nuclear attack would be when the incoming weapons actually detonate on their soil, but that is by no means vastly different from the situation currently obtaining, for example, in China today. When these attacks occur—assuming that they do

547 Gottfried and Blair (eds.), Crisis Stability and Nuclear War, p. 56.
not totally devastate Indian society—even a relatively primitive system of report-back would ensure that Indian decisionmakers had the information they needed to fashion their own retaliatory response.\textsuperscript{548}

While this scenario obviously represents the best outcome from the perspective of avoiding mistaken authorized use—since nuclear retaliation takes place only after incontrovertible evidence of nuclear attack is made available—even the more probable contingency of increased readiness under conditions of strategic warning embodies only a minimal prospect of mistaken authorized use. This is because so long as enhanced readiness mainly involves the relocation of nuclear reserves and components (although integration of fissile pits and SAFF components prior to absorbing an actual attack is not ruled out), the possibility of mistaken authorized use is still non-existent so long as completed nuclear devices are not surrendered to the end user prior to the explicit authorization of retaliatory strikes. From all indications, this appears to be the preferred concept of operations currently associated with the force-in-being. Consequently, it is likely that the immunity to mistaken authorized use will continue to obtain even as Indian security managers look for better technical ways to preserve negative control while they increase the responsiveness of their nuclear assets during conditions of supreme emergency.\textsuperscript{549}

**Accidental Detonation.** All technologies, including nuclear weapons, are susceptible to a variety of accidents. In the case of nuclear weapons, however, any accident leading to a chain reaction in

\textsuperscript{548}It is important to recognize that the IRS-3 satellite system already in orbit can provide—though not instantaneously—information about nuclear attacks that may have been unleashed on India after they occur. As the new Test Evaluation Satellite and other follow-on systems become operational, the Indian capabilities for postattack confirmation will only improve further.

\textsuperscript{549}Raj Chengappa has claimed that the Indian Prime Minister carries "the nuclear trigger in a tiny attache case that goes wherever the prime minister goes." If this claim is true, then the Indian command system could assume the posture illustrated in Figure 14 immediately, since completed nuclear weapons could be readily dispersed to their end users early in a crisis, with negative control maintained entirely through technical rather than organizational means. See Chengappa, *Weapons of Peace*, pp. xv–xvi. This description, however, has not been corroborated by any other source within or outside India and hence must be treated as a possible or, more likely, a speculative account.
the fissile core could have catastrophic consequences, depending on the type of nuclear weapon involved and the location of the accident. For this reason, the established nuclear powers, especially the United States, expended enormous amounts of time and resources to ensure that nuclear accidents—were they unfortunately to occur—would not lead to any accidental detonation caused by a chain reaction inadvertently triggered in the fissile core. This emphasis makes it obvious that accidental nuclear detonations represent the limiting case and are a subset of a much larger category of nuclear weapon accidents that may in turn be broadly classified into three distinct categories of threat: dangers arising from the damage or destruction of inert nuclear weapons; dangers arising from an accidental or inadvertent nuclear detonation; and dangers arising from accidental nuclear war triggered as a result of an accidental or inadvertent nuclear detonation. While all nuclear weapon accidents are no doubt unsettling, the last two dangers simply represent unacceptable kinds of threats. Therefore, it is not surprising that the established nuclear powers have devoted significant attention to developing a variety of “positive measures”—technical design features and organizational procedures existing solely to provide weapon safety and security—intended to avoid just such contingencies.

Whether Indian nuclear weapons in particular or the force-in-being in general is safe is a critical question, but it is one that cannot be assessed at this point because the technical characteristics of New Delhi’s weapon designs are not publicly known. In the absence of information about how Indian nuclear weapons are designed for immunity to heat, shock, pressure, and radiation and whether they include devices such as insensitive high explosive, weak-strong links, and PALs, conclusive judgments about the safety of such weapons must be deferred. For these reasons among others, it is also difficult to assess how susceptible to damage or destruction inert Indian

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weapons actually are—a deficiency only compounded by the fact that little is publicly known about the handling procedures and human factors connected with their maintenance, stowage, and transportation. Despite this lack of information, it is not unreasonable to assume that—within the limitations of the available technology—Indian nuclear weapon designs would be biased toward ensuring safety; although there is no empirical evidence available to confirm or refute this hypothesis, the force-in-being’s strong emphasis on negative as opposed to positive control makes this claim more reasonable than its antithesis.

More confident judgments can be made with respect to the dangers of accidental nuclear detonation as well as accidental nuclear war triggered as a result of an accidental nuclear detonation. The Indian force-in-being is likely to be highly resistant to an accidental nuclear detonation simply by virtue of its posture, which emphasizes separated weapon components. This pattern, which in fact replicates U.S. safety practices in the earliest years of the Cold War, implies that the prospect of an accidental nuclear detonation is minimal at least in the context of the peacetime disposition of the force-in-being. Whether the same condition obtains after the integration of weapon components takes place during an emergency is less clear because the design characteristics of Indian nuclear weapons are not publicly available. If the narrative in Chengappa’s *Weapons of Peace* is to be believed, these assembled weapons *may* not have important safety features such as one-point safety, weak-strong links, and unique signal requirements—or at least that is the conclusion suggested by passages like “Sikka [the principal weapon designer during the May 1998 tests] and the others worried over the fact that if a bolt of lightning struck the ‘Prayer House’ [the code word used for the bunkers where the devices were assembled] it could mess up the device or even in an extreme case detonate one of them." If these descriptions are in fact accurate depictions of the fragility of India’s nuclear devices, the only saving grace may be that the integration of weapon components and of the completed weapon itself with the delivery system (depending on the degrees of separation maintained between these components) would most likely take place at assembly areas somewhat removed from major population centers. Since this is

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likely to be the case, the otherwise catastrophic effects of an accidental nuclear detonation, should one occur, might be minimized—an outcome made all the more certain by the fact that India’s standard fission devices have relatively low, 12- to 20-kt-class yields. While this is no doubt small consolation, the fact remains that the lack of authentic public information about India’s nuclear weapon designs and about the handling practices associated with these weapons, especially during a crisis, makes any guesses about their safety—after systems integration is completed—hazardous indeed.

The prospect of an accidental nuclear detonation triggering an accidental nuclear war is in general rather low. This reassuring conclusion with respect to the third kind of nuclear accident cited above can be advanced in large measure because of the deployment postures maintained by all three South Asian states: China, India, and Pakistan. The nuclear capabilities resident in all three countries are not intended or designed for the conduct of prompt operations. Consequently, the danger that an accidental detonation occurring on the home territory of any of these countries might trigger a catalytic spasm of retaliatory violence by other competitors is minimal. If the surveillance capabilities existing at present are any indication, it is in fact likely that none of these three states would even know that an accidental nuclear detonation had occurred on the homeland of the other until they were so informed by the state that had suffered the accident, by the superpowers, or by the international media (which in turn would learn about the event from either the victim or the superpowers). This is because none of the South Asian states possesses GEO satellites with multispectral sensors of the kind deployed by the U.S. Nuclear Detection System aboard the NAVSTAR/GPS constellation. Thus, an accidental nuclear detonation occurring on the homeland of one country could not be instantaneously detected by the others; at most, the others would immediately pick up seismic signals of an ambiguous nature depending on the yield and altitude of the detonation, and over time they might pick up more conclusive evidence in the form of radioactive debris, depending on the wind speed and flow patterns. None of these indicators, however, would

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554 The capabilities of this system are described in Blair, Strategic Command and Control, pp. 261–262.
be available immediately or in conclusive form through these states’ own warning systems.

This limitation has stabilizing consequences in that none of the other states could respond even if they wanted to simply because they currently lack the real-time knowledge of what has actually occurred. These benefits accruing from the lack of tactical warning often go unappreciated by many Western commentators, who erroneously conclude that the absence of a “state-of-the-art early warning and intelligence-gathering capability” necessarily implies that “in the event of an accident” the South Asian states “might have little or no time to make an accurate assessment of what has happened or what to do next.” In fact, precisely the opposite is true: Because the South Asian states will not know what has actually happened, they will be freed from the burden of having to respond instantaneously. Even if they did know, however, they would be burdened mainly by the obligation to undertake prudential measures that enhance the survivability of their existing assets—through increased alert and emergency dispersal actions—in case the accident turned out to be the leading edge of an adversary’s unfolding attack. There would nevertheless be little objective reason for any of the South Asian states to respond to such an ambiguous event with a prompt attack of its own, among other things because such a hasty action would not produce satisfactory damage limitation and would not be necessary for the preservation of that state’s own strategic reserves given the opacity surrounding the nuclear forces on all sides. At the very least, therefore, prudence and good judgment—in addition to objective calculations—would require that the victim investigate the circumstances surrounding such an ambiguous event, perhaps even soliciting the assistance of the international community, before any catastrophic actions that cannot be undone are unleashed in response. This generally sanguine conclusion about the potential for accidental war to be triggered by accidental detonations also holds in one other situation: an accidental nuclear detonation occurring on the territory of another state. This eventuality could materialize only

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556 This is in effect the answer to the questions posed by Gregory F. Giles, “Safeguarding the Undeclared Nuclear Arsenals,” Washington Quarterly, 16:2 (Spring 1993), p. 183.
if aircraft or other delivery systems carrying nuclear payloads routinely operated over foreign (including adversary) territories as part of their preparations for nuclear attack. Since the Indian force-in-being will not be employed in the service of any such posture, these contingencies can be ruled out.

**Terrorist Seizure.** The last challenge that the force-in-being must successfully surmount is immunity to terrorist attacks and seizure. In a strict sense, this class of contingencies represents a subset of the threats posed by unauthorized use. The problems of terrorist attacks and seizure, however, are treated separately because of their two unique characteristics: Both involve a threat that usually emerges from outside as opposed to inside an organizational structure, and both are usually characterized by a high degree of systematic effort oriented toward advancing certain ends.\(^{557}\) Traditionally, the established nuclear powers responded to the challenge of nuclear terrorism by ensuring that terrorists could never secure physical control over nuclear weapons to begin with and, even if they did, could never detonate them. Achieving the former objective required the development of complex systems for controlling physical access to nuclear weapons accompanied by stringent procedures for screening all personnel who enjoyed any access to such weapons during storage, transport, deployment, or operations. Achieving the latter objective required essentially the same technical systems developed to prevent other forms of unauthorized nuclear use.\(^{558}\)

The Indian force-in-being is likely to enjoy a high degree of immunity to terrorist attacks and seizure despite the fact that the country is usually racked by several kinds of insurgencies at any given point in time. Indian insurgents, as a rule, have never distinguished themselves in terms of their ability to carry out focused special operations of the sort that would be required for nuclear terrorism; their usual accomplishments generally consist of harassing and

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threatening civilian populations, carrying out discrete attacks on police, military, and paramilitary pickets, and attacking thinly defended symbolic sites. Thus far at least, no Indian insurgent group has yet been identified as possessing the kind of sophisticated equipment and weaponry necessary to carry out complex covert operations against a trained and alerted defending force. In any event, successfully defending against terrorist attacks and seizures in the context of the Indian force-in-being would require that strategic managers safeguard both fixed installations—where nuclear weapons and delivery system components may be produced, stowed, or maintained—and mobile reserves such as missiles and TELs and their associated launch equipment, which may be dispersed from their peacetime locations under conditions of crisis.559

Both types of assets are likely to be shielded by a defense-in-depth approach in which multiple layers of opacity, strong local defenses, and constant or intermittent movement would be used to frustrate any effort at illegitimately capturing critical nuclear assets. The pervasive uncertainty about where components are stored thus represents the first and critical line of defense. This information is so tightly held by the senior managers of India’s strategic enclaves that simply locating targets for seizure or attack would be a formidable proposition. A successful solution to this problem would have to include insider information, but even such solutions are always beset by the dangers of incompleteness and potential unreliability. In any event, even if certain sites are identified, the local defenses must be overwhelmed before their contents can be compromised. Yet all fixed sites in India that are of any strategic value are heavily defended, and these defenses are always reinforced in times of crisis. Obviously, there is always scope for improving security arrangements further, and it is most likely that New Delhi will pursue such improvements as its force-in-being evolves over time. All such efforts will no doubt encompass difficult trade-offs; enhancing security in a visible way can, for example, increase the salience of the given facility and attract more attention from terrorist groups than is otherwise

559 A useful survey of the challenges pertaining to nuclear terrorism in South Asia and a review of some of the Indian responses to the same can be found in Paul Leventhal and Brahma Chellaney, “Nuclear Terrorism: Threat, Perception, and Its Response in South Asia,” Terrorism, 11 (1998), pp. 447-470.
likely. On the other hand, reducing visible security might weaken the security of a critical installation. Obviously, the best way out of this conundrum is to develop strong local defenses with minimal signatures, but operationalizing such solutions in a technical sense can often turn out to be difficult and costly. Irrespective of what solution is finally adopted, most competent observers today conclude that physical safety at all publicly known strategic facilities in India is fairly robust.\textsuperscript{560}

Any discussion of the effectiveness of security arrangements with respect to mobile reserves would be premature at this point because India does not yet possess mobile missiles slated to carry nuclear payloads. When these systems are deployed several years hence, they will be maintained in protected garrisons during peacetime, and likely without their nuclear warheads. Under routine conditions, therefore, they will reap all the benefits accruing from the strong positional defenses surrounding them. It is most likely that when they are flushed from their garrisons during an emergency, they will be accompanied by dedicated military escorts, with other reserve elements available for reinforcement should that be required.\textsuperscript{561} During this phase, however, their principal form of protection would derive from constant or intermittent movement so as to complicate the "targeting solutions" that would have to be derived by any terrorist group intent on seizing these assets. The great advantage of the force-in-being, finally, is that completed nuclear weapons not only are unlikely to exist in peacetime but are unlikely to be mated to the unalerted delivery systems in ordinary circumstances. Seizing a complete, usable weapon system would thus be difficult, since even success might involve merely the capture of a given part rather than custody of any integrated weapon system ready for use.


\textsuperscript{561} A good description of how India's nuclear pits were transported during the May 1998 tests may be found in Chengappa, "The Bomb Makers," pp. 31–32. In contrast to this event, which focused on ensuring security principally through opacity, known (or recognizable) military assets in India are invariably moved or transferred under the protection of heavily armed convoys.
On balance, therefore, the Indian force-in-being—if operationalized in the best possible form imaginable—would appear to be relatively effective in meeting many of the challenges associated with peacetime safety and security. Obviously, this conclusion will have to be revisited as the force-in-being evolves and as many of its key components are gradually inducted into the Indian arsenal. Until that point, however, it is reasonable to conclude that the force-in-being—at least when assessed as a concept advanced by Indian security managers rather than as a completed material artifact—displays many desirable properties that make it potentially safer than several other conceivable deployment postures. So long as Indian security managers maintain the preference schedule outlined in Table 6, the force-in-being should meet most of the standard criteria of successful deterrence even as it diminishes many of the difficult structural dilemmas associated with possession of a nuclear weapon capability.

The discussion thus far suggests that India’s evolving force-in-being could meet many of the challenges posed by the presence of nuclear weapons in peacetime. The critical question facing any deterrent, however—will it deter?—has been raised at different points in previous chapters but has not yet been systematically addressed. Whether a deterrent, however it is configured, can actually deter specific adversaries is an issue that cannot be conclusively resolved either in the abstract or in advance. In part, the problem is methodological, because successful deterrence, which may be defined as averting potential attack, effectively requires accounting for something that does not occur; as one analysis perceptively put it, “One

**Table 6**

**Current Preference Schedule of Indian Security Managers with Respect to Nuclear Capabilities**

<table>
<thead>
<tr>
<th>Event</th>
<th>Relatively Unacceptable</th>
<th>Relatively Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (prelaunch) systems integrity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Poor (postattack) responsiveness</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Unauthorized use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Mistaken authorized use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Accidental detonation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Terrorist seizure</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
can know that deterrence has failed but never that it is succeeding.”
In part, the problem is also substantive because it presumes a propensity on the part of an adversary to attack that may or may not exist in any given instance. While the substantive problem can be resolved in principle when deterrence effectiveness is examined in the context of past events, it is simply insurmountable when deterrence effectiveness against future threats is at issue. For these reasons, the problem of effectiveness—or, put another way, the question of whether a given deterrent can deter—can be addressed only a priori by examining how it comports with some established formulations of rational deterrence theory.

This question is particularly interesting in India’s case because even when the evolutionary process of developing the force-in-being is finally completed many years from now, New Delhi’s deterrent will still be quite modest by the standards of the superpower arsenals maintained during the Cold War. If, for example, India’s fissile materials are assessed ten years out, the country will certainly have a larger stockpile than it has today, but not one that is larger by orders of magnitude. Assuming that no FMCT constraints are enacted in the interim, India could add between 12–16 kg of Pu$^{239}$ per annum—at its traditional rate of accumulation—and 45–90 kg of Pu$^{239}$ per annum were it to greatly expand its production and separation capabilities. This implies that India could add between 120–160 and 450–900 kg of additional weapons-grade plutonium to its inventory by the end of the current decade—enough for roughly 20–26 to 75–150 simple fission weapons—if it is assumed that roughly 6 kg of Pu$^{239}$ are used to fabricate a single weapon. Many Indian analysts, however, discount the high-end estimates altogether. Brahma Chellaney, for example, actually concluded that “the possible maximum size of an Indian armory before an FMCT is negotiated and brought into effect” is likely to be “less than 100 warheads.” All estimates con-

564 See the discussion on fissile materials earlier in this chapter.
565 Brahma Chellaney, “After the Tests: India’s Options,” Survival, 40:4 (Winter 1998), p. 107. If it is assumed that FMCT constraints do not bar the continued physical production of weapons-usable materials, India might be able to regularly produce
sidered, therefore, New Delhi is unlikely to have a *gigantic* stockpile of weapons-grade materials even by the end of this decade: Assuming it had roughly 300 kg of Pu$^{239}$ in the year 2000 and that it continues to add somewhere between its traditional and its expanded rates of annual accumulation, the Indian fissile-material stockpile in the year 2010 would stand at somewhere between 420–460 kg and 750–1200 kg of Pu$^{239}$, with some additional quantities of U$^{235}$ thrown in for good measure. This would produce a force inventory of between 70–76 and 125–200 simple fission weapons—at a rate of 6 kg of Pu$^{239}$ per warhead—some ten years hence. This stockpile would certainly be minuscule even in comparison to the 1997 estimate of China’s fissile-material inventory, which has been assessed to consist of some 4000 kg of weapons-grade plutonium and 20,000 kg of HEU.\(^{566}\)

If India were to sign the CTBT in the next few years without resuming its test program, New Delhi’s fissile-material inventory would be useful primarily for the production of simple fission weapons alone. Even if the May 1998 tests were partially successful with regard to some elements of the advanced nuclear designs that were tested, India would not be able to migrate to an arsenal consisting even of boosted fission weapons without a resumption of hot testing.\(^{567}\) To be sure, Indian nuclear scientists have claimed that their current technical capabilities allow them to develop warheads capable of producing yields in the region of 200 kt—but there is little empirical evidence to back up these declarations, and if New Delhi continues to abide by its self-imposed moratorium on field testing, it will be difficult for outside observers to believe that boosted fission weapons bearing such yields would in fact constitute the mainstay of

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\(^{566}\)David Albright, Lauren Barbour, Corey Gay, and Todd Lowery, “Ending the Production of Fissile Material for Nuclear Weapons: Background Information and Key Questions,” available at http://www.isis-online.org/publications/fmct. This inventory would in theory yield some 1666 weapons of ~15-kt yield at the rate of 6 kg of Pu$^{239}$ and 20 kg of HEU per weapon. Even if the Chinese fissile-material stockpile is only half the size it is usually assumed to be, this still implies that Beijing would have the capacity to produce 800-odd simple fission weapons. In practice, however, these weapons would not be simple fission weapons because China’s relatively superior nuclear weapon technology allows Beijing to use its fissile-material stockpile to produce a large number of high-yield boosted fission or thermonuclear weapons.

\(^{567}\)Jones, *From Testing to Deploying Nuclear Forces*, pp. 7–8.
the Indian nuclear arsenal in the future. Of course, New Delhi could
develop all sorts of new weapon designs, some capable of producing
even higher yields in the interim, but in the absence of field testing
the effectiveness of these designs could not be either verified experi-
mentally by Indian scientists or credibly communicated to India’s
adversaries for purposes of deterrence. In any event, by the time the
force-in-being is on the road to maturity some ten years from now,
India will have many other strategic capabilities in place. At that
point, for example, India should have completed the development of
the Agni follow-on—a solid-fueled, rail-mobile IRBM capable
of reaching some 3500 km—and may well be on its way to developing
even longer-range missiles if these levels of performance are judged
to be insufficient. It will also possess much of the supporting
infrastructure and the procedural systems necessary to manage its
nuclear deterrent in a relatively effective way.

Consequently, the force-in-being available by the end of this
decade could consist of some 70 to 200 simple fission weapons car-
ried by a mix of aircraft and missiles (the latter perhaps existing in
larger numbers than the warheads themselves), complemented by a
useful supporting infrastructure together with the necessary proce-
dural systems. This force architecture would still not be oriented
toward executing complex war-fighting operations, but if Indian
judgments today are any indication, it would suffice for purposes of
deterring blackmail and punishing any nuclear attacks on India.

The character of this hypothesized force architecture must, how-
ever, be qualified on two counts. First, descriptions of the size and
structure of this deterrent are based on many assumptions—such as
the continuation of India’s moratorium against nuclear testing—
primarily for heuristic reasons: They are not meant to be an accurate
portrayal of what will exist 20 years from now. Instead, they are in-
tended to convey an impression of what could exist primarily for the
purpose of understanding whether such a force-in-being would be
sufficient vis-à-vis Pakistan and China from the perspective of rational
deterrence theory. Second, the exact size, quality, and disposition
of the Indian nuclear force existing ten years out will be a state secret.
Hence, the best that foreign observers—and India’s adversaries—
may be able to do in this regard is to infer what capabilities New
Delhi possesses. The latter may even seek to verify these capabilities
by clandestine means, but if Indian attempts at deception and denial
are as successful as they have been thus far, there will always be a significant margin of uncertainty about the exact character of India’s strategic capabilities. This is a significant issue from the perspective of deterrence efficacy because it implies that no matter how plausible the capabilities hypothesized above actually are, India’s adversaries will always have to reckon with the possibility that New Delhi’s nuclear prowess could turn out to be either larger or more effective than they themselves—or analysts standing on the outside—have assessed it to be.

Once these caveats are understood, it is easy to recognize that the question of whether India’s nuclear capability can effectively deter its two major adversaries is not meant to be answered empirically but is intended to be addressed only at the level of principle. The question this issue embodies essentially pertains to the query made famous during the Cold War: “How much is enough?” And this question, when raised in the context of the Indian deterrent, often carries with it the explicit or implicit criticism that the capabilities represented by a small force-in-being—especially of the type referred to in the foregoing paragraphs—would be inadequate to provide the kinds of deterrence benefits India requires. This criticism of the evolving force-in-being has been vocalized most consistently by Indian hawks, though it has also found resonance among many Western analysts schooled in the classical conceptions of nuclear deterrence manifested during the Cold War. At their root, the arguments these critics put forth boil down to three issues: The Indian stockpile of fissile materials is too small and, as a consequence, restricts the country to a fairly modest stockpile of nuclear weapons relative to its most significant adversaries, which “in effect would formalise the Sino-Indian asymmetry”; the size of the biggest Indian nuclear weapons is still too picayune and, as such, prevents the country from being able to levy the high absolute levels of punishment that those adversaries who are armed with thermonuclear weapons could inflict on India; and finally, the size of the Indian delivery force is much too small and insufficiently diversified, resulting in a lower

569 Chellaney, “India’s Wrong Signal on Fissile Cut-Off.”
overall balance of capabilities vis-à-vis New Delhi’s most significant sources of threat.\footnote{Meen, A Nuclear Strategy for India, pp. 177–234.}

While the last criticism will lose some of its bite as new delivery systems come on line over time, the first two will endure so long as New Delhi does not increase its inventory of weapons-grade plutonium and remains reluctant to resume full-up testing of its nuclear weaponry. Even in this context, however, the second issue may turn out to be more significant than the first because a stockpile that consists of 100-odd weapons, while not gargantuan by any means, does not constitute a token arsenal. It could still be effectively used in a wide variety of contingencies, especially because the Chinese nuclear arsenal is not assessed by Indian security managers as being much larger than 350-odd weapons in size. While a force ratio approximating 100:350 is certainly not “balanced,” it is not radically asymmetrical either.\footnote{This issue is discussed in Chelane, “After the Tests: India’s Options,” pp. 105–108.} Consequently, a force of 100-odd weapons may suffice for India’s needs if the Chinese nuclear arsenal does not expand dramatically in terms of its weapon stockpile over time; Indian warheads and their delivery systems are reasonably survivable; and there continues to be enduring uncertainty about the true size and effectiveness of the Indian arsenal writ large. The disadvantages of relatively small yields may therefore turn out to be more salient from the perspective of deterrence sufficiency because the inability of fission weapons to inflict punishment comparable to that levied by thermonuclear warheads may suggest a disadvantage where the “balance of punishments” is concerned. If India does not return to the nuclear test ranges in the future, its ability to deploy advanced nuclear weapons, including thermonuclear devices, will certainly be stymied; at the very least, it will be unable to credibly communicate to its adversaries that it possesses such instruments for purposes of deterrence, even though it can continue to exploit those uncertainties in their decision calculus that would always arise from the ambiguities inherent in New Delhi’s covert nuclear capability. The sufficiency of an Indian force-in-being without thermonuclear capabilities and subsisting at the kinds of modest force levels available...
ten years out is therefore an analytic issue that must be squarely addressed.

When the question of deterrence sufficiency is considered, it must first be understood that India’s ability to deter a nuclear-armed Pakistan is not at issue: Irrespective of what Islamabad’s nuclear arsenal might look like two decades from now, Pakistan ought to be deterrable even with relatively modest Indian nuclear forces simply because its geophysical limitations make it highly vulnerable even to relatively low levels of retaliation that New Delhi might unleash.\footnote{This conclusion holds on the standard assumptions of rational deterrence theory—rationality, unitary actors, sensitivity to costs, etc.—and on the belief that whatever the handicaps afflicting India’s deterrent may be, they will be resolved “eventually.” If this conclusion therefore fails to hold over time, it will be mainly because one or both of these key assumptions do not survive robustly. Since the present analysis, however, is not about whether India can successfully deter Pakistan in all imaginable circumstances but only whether its capabilities are adequate prima facie in terms of rational deterrence theory, nothing more is claimed or suggested herein.} The most important political province in Pakistan, for example, the Punjab, can be effectively devastated simply by targeting the major population and industrial centers throughout this prosperous state. Thus, even if Pakistan is able to interdict and eliminate a substantial proportion of India’s retaliatory capacity, New Delhi would still be able to inflict horrendous punishment on Pakistan—in terms of causing mass death—if it is capable of successfully delivering just a handful of -15-kt weapons on these critical targets. If New Delhi can successfully deliver a larger number of such warheads, it should be able to ravage even more population centers throughout the Punjab and the Sind, thereby effectively disabling all the most productive centers within the Pakistani state. The sufficiency requirements for successful deterrence vis-à-vis Islamabad are therefore relatively low for India; even if Pakistan’s own nuclear capabilities grow severalfold in the next two decades, India should be able to sustain relatively robust levels of nuclear deterrence stability so long as it can ensure that a small number of weapons can always be successfully detonated on critical Pakistani countervalue targets.\footnote{Once again, this argument is constructed on the assumptions of rational deterrence theory.} Given Pakistan’s stark geophysical vulnerabilities, successful deterrence vis-à-vis Islamabad does not require either large numbers of nuclear weapons or extremely high-yield weapons, since modest retaliatory attacks
can by themselves inflict so much damage as to provide India with effective “assured destruction” capabilities and, under some circumstances, even a kind of “escalation dominance” despite the possible presence of a small residual force. Since New Delhi will in all probability have a nuclear arsenal that is numerically larger than Pakistan’s 10 to 20 years hence, and since this arsenal will enjoy greater survivability thanks to the increased uncertainty issuing from dispersal over a much larger landmass, the deterrence benefits accruing from Islamabad’s physical vulnerability should be further magnified.

If the problem of generating effective deterrence vis-à-vis Pakistan is not a critical challenge from the perspective of sufficiency, the same argument does not hold where deterring China is concerned. This is because Beijing is and will continue to be a superior nuclear power whose lead both in numbers of weapons and in relative warhead yields is unlikely to be reduced by India’s technical achievements during the next two decades. The constraints afflicting New Delhi in this regard are not produced by technical inferiority simpliciter; rather, they are fundamentally a product of both external pressures and internal preferences. If India were not encumbered by pressures relating to the CTBT, for example, it could continue to develop and test nuclear weapons until it was able to produce megaton-size warheads of the kind found in the Chinese arsenal today. This, of course, presumes that Indian policymakers would require high-yield warheads from their strategic enclaves—a presumption that has not yet been corroborated by any official statements emerging from the senior Indian leadership, who for all intents and purposes seem satisfied that their simple fission warheads are sufficient for effective deterrence. Similarly, India’s own relatively small fissile-material inventory, combined with the looming restraints embodied by an FMCT, ensure that it will not produce fissile-material stocks anywhere close to those its larger rival possesses. Again, this presumes that Indian policymakers would demand a large fissile-material inventory from its nuclear estate, but the past record of Indian plutonium production and separation activity does not appear to bear out this assumption.

In any event, what all this suggests is that thanks to a variety of constraints—some external, some self-imposed—New Delhi is faced with the prospect of deterring a larger and more capable rival, China, with only modest nuclear capabilities of its own. These capabilities—
if the previously hypothesized Indian force structure is reiterated for the sake of argument—could materialize in the form of 100-plus long-range missiles, each armed with something resembling a ~12 to 20-kto simple fission warhead, facing more than 100 to 200 Chinese strategic missiles, each armed with a warhead that may be capable of producing yields as high as 3–5 Mt. This while these contending force structures obviously do not yet exist and may not even exist in this form 10 to 20 years hence, they are nonetheless useful for illustrating the nature of the deterrence problem India faces. Even if New Delhi produces the same number of long-range missiles as its largest adversary—something it may not do to begin with—it still cannot inflict equivalent levels of punishment on China because of asymmetries in the yield and number of warheads that both sides will possess.

Given this fact, how can New Delhi expect to deter Beijing? Many observers, drawing from the established architectures of nuclear deterrence made familiar during the Cold War, argue that India has no choice but to expand the number of nuclear weapons it possesses while increasing the yields of such weapons to levels comparable to those attained by China. This argument would in effect require India to abjure signing the CTBT, resume hot testing of its nuclear weapons, and sharply accelerate the production of fissile materials. While it is possible that India might pursue one or more such initiatives in the future, it does not appear to be frenetically exploring any of them right now. This could imply either that New Delhi does not understand the requirements of sufficiency, especially as dictated by the classical model of deterrence exemplified during the Cold War, or that it believes effective deterrence can be obtained—even against asymmetrically powerful competitors—with relatively low levels of nuclear capability. If the writings of most Indian elites and the views of its strategic managers are any indication, the latter explana-

575 China is currently believed to possess some 125 missiles with ranges ≥ 1700 km (see SIPRI Yearbook 1997 [New York: Oxford University Press, 1997], p. 401). The number of Chinese strategic missiles a decade or so from now—200—is discussed in Myers, "Study Said to Find U.S. Missile Shield Might Incite China." Obviously, China would continue to possess many more missiles of shorter range that can be used in some contingencies against India—in addition to aircraft-delivered gravity bombs and tactical nuclear warheads.

576 Jones, From Testing to Deploying Nuclear Forces, pp. 3–8.
tion accounts better than any other for the measured pace at which India’s strategic capabilities are currently being developed.\textsuperscript{577}

Even a cursory review of Indian strategic writings suggests that New Delhi’s force-in-being will come much closer to the French model of “deterrence of the strong by the weak” (\textit{dissuasion du faible au fort}) than to the American model of “deterrence by denial,” which centered on the creation of large, diversified, and secure second-strike forces capable of achieving counterforce preeminence at various levels of conflict. The French vision of deterrence, exemplified by the \textit{force de frappe}, underwrote the nuclear postures of at least three states during the Cold War—Great Britain, France, and China—and in each instance a relatively weak nuclear power was able to deter a superior adversary—the Soviet Union—from pursuing aggressive acts despite the latter’s overwhelming predominance in nuclear capabilities. The effectiveness of deterrence in these situations of radically asymmetric capabilities constitutes a fascinating puzzle, and understanding it is important for the insights it may offer into how New Delhi might be able to garner comparable benefits in the Sino-Indian relationship without mimicking the U.S. solution of creating complex countervailing capabilities designed to frustrate the adversary at every rung of the escalatory ladder.

There were essentially three reasons the “deterrence of the strong by the weak” turned out to be relatively stable during the Cold War. First, the massive U.S. investments in deterrence vis-à-vis the Soviet Union created significant “positive externalities” that even relatively weaker powers could exploit to preserve their own security. This argument essentially implies that successful deterrence has some characteristics of a public good: It creates benefits that can be harvested by others who might not have contributed to producing it in the first place. Translated into the context of the Cold War, this public-good argument suggests that the same U.S. nuclear forces which prevented a Soviet assault on Washington’s global interests simultaneously created niches of security which even states that did not produce any nuclear weapons could enjoy. This explanation, at any

\textsuperscript{577}“India Not to Engage in a N-Arms Race: Jaswani,” and Joshi, “India Must Have Survivable N-Arsenal.”
rate, suggests why countries like Sweden could enjoy security from Soviet threats even while remaining outside the Atlantic alliance.\textsuperscript{578}

Second, the weakness of small nuclear forces against the overwhelming Soviet threat was often mitigated by their tight coupling to the stronger nuclear capabilities of the United States. This argument asserts, in effect, that the possession of weak nuclear forces imposed no significant political penalties, since these instruments subsisted—for all practical purposes—as strategic appendages of a much stronger nuclear power. In the context of the Cold War, this implied that countries with minimal nuclear capabilities, like Great Britain, or countries with no nuclear capabilities whatsoever, like Germany, essentially overcame their disadvantages by tightly coupling their security needs to the massive nuclear reserves produced and maintained by the United States. By integrating British nuclear capabilities into the American SIOP and emplacing U.S. defensive, including nuclear, assets on German soil, the NATO alliance eliminated the disadvantages accruing to weakness by effectively transforming all its weaker constituents—both those with nuclear weapons and those without—into nuclear protectorates of the United States.\textsuperscript{579}

While these two arguments can effectively explain why European neutrals and tightly coupled weaker allies were able to preserve their security in the face of overwhelming threats—even without nuclear weapons in some instances and with only weak nuclear capabilities in others—they do not completely account for how weak nuclear powers that were threatened by the Soviet Union but were not tightly coupled to the U.S. nuclear deterrent were also able to protect themselves more or less successfully. The two principal anomalies here were France and China: The former had a loose and idiosyncratic affinity to the U.S. deterrent, while the latter lay completely outside the formal ambit of American protection. Both were perversively threatened by superior Soviet nuclear forces, and yet both managed to survive the Cold War—despite their conspicuously weak nuclear deterrents—without any serious mishaps. If the hypothesis of benign

\textsuperscript{578}Coles, \textit{Sweden Without the Bomb: The Conduct of a Nuclear-Capable Nation Without Nuclear Weapons}.

\textsuperscript{579}See the discussion in Kenneth A. Myers (ed.), \textit{NATO, the Next Thirty Years} (Boulder, CO: Westview Press, 1980).
Soviet intentions is excluded, the only credible explanation for this class of cases remains the French theory of “deterrence of the strong by the weak,” and this argument constitutes the third explanation—actually rounding out the logic of the first—as to why relatively infirm powers were able to hold off much stronger adversaries.

The most common intuitive explanation for successful deterrence in these cases rests on the awesome power of nuclear weaponry—or, in other words, on the significance of the nuclear revolution. While this is certainly an important component of why weak nuclear powers were able to deter even stronger nuclear adversaries, it is insufficient. As one particularly insightful analysis has argued, successful nuclear deterrence of the strong by the weak ultimately “rests on the possibility that the latter will have at his disposal a deliverable devastating nuclear force and may prove to be an unsafe actor.” This conjoint requirement for the success of deterrence under conditions of radical asymmetry in capabilities can be satisfactorily explained in terms of rational deterrence theory.

In any contest between two asymmetrically capable nuclear powers, the weaker nuclear power can never rationally choose to make good on any of its retaliatory threats because the execution of these threats would invariably result in much greater pain for the weaker state. By this logic, a stronger nuclear state ought to be able to successfully blackmail a weaker one on every occasion simply because the consequences of being outgunned in the resulting exchange of punishments would always deter the latter. Even if the weaker state attempts to respond to blackmail with threats of limited use—in order to avoid the conclusive defeat that would be meted out as a result of threatening “massive retaliation”—the sequence of graduated escalation that could follow would inevitably end with the weaker power running out of limited options sooner or later, since the stronger state could respond to every such option with comparable if not higher levels of violence. In terms of rational deterrence

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theory, therefore, the weaker state must lose every time it engages in a contest of wills with a stronger nuclear power: Once it has run out of limited nuclear-use options, it must either surrender or engage in a massive “last roll of the dice” nuclear attack—an attack that is by definition suicidal in that the stronger power, which presumably was restrained until this point, loses every incentive to remain temperate in the aftermath. Faced with such choices, the alternative of suicide is invariably irrational for the weaker state, since the payoffs accruing to final and conclusive destruction are always less than the payoffs to surrender (because the latter at least embodies the hope that the consequences of defeat could someday be reversed if the conditions are propitious).\footnote{582}{Robert Powell, “Nuclear Deterrence and the Strategy of Limited Retaliation,” \textit{American Political Science Review}, 83:2 (June 1989), pp. 503–519.}

If this logic was all there is to strategic deterrence, success in the nuclear realm would necessarily require all the competing actors to be equally robust, since weak nuclear states could never expect to successfully deter any threats issued by their stronger adversaries. Mercifully, there are in practice two variables that allow even weaker states to coexist with stronger nuclear powers, and it is the presence of these variables that arguably enables deterrence of the strong by the weak to survive as a reasonable alternative to deterrence produced by the rough equality of coercive capabilities.\footnote{583}{This is not meant to imply that the former is to be preferred over the latter, but only that when the latter cannot be produced, the former could suffice in some specific circumstances. Also, the qualifier “arguably” is employed because it is difficult to establish conclusively whether “deterrence of the strong by the weak” could be effective independently if the positive externalities of American or some other great-power deterrence were absent.} The first variable is simply the enormous destructive power embodied by nuclear weaponry: This implies that even weaker powers can harm much stronger adversaries in a manner \textit{disproportionate to their relative strength}, and unless the latter are confident of their ability to execute “splendid” disarming strikes, they must reckon with the prospect of suffering high absolute, even if only lower relative, levels of pain. The second variable is the unpredictability of decisionmaking entities under conditions of strategic threat. While rational deterrence theory presumes that political decisionmakers in the weaker state would perceive the hopelessness of their condition and, acting rationally on
that perception, invariably surrender to the stronger power, there is no guarantee ensuring such an outcome will always occur in practice. Thanks to imperfect information obtaining in any operating environment, security managers in the weaker state may in fact proceed to behave like "contingently unsafe actors."\textsuperscript{584} and may choose to execute options that they might not otherwise have chosen were they omniscient about both their choices and the consequences of those choices. Since any use decision in the nuclear realm embodies high absolute costs—either because of the high costs of some kinds of discrete nuclear use or because of the high costs resulting from cumulative nuclear use—even stronger nuclear powers can be dissuaded from embarking on a course of strategic action that threatens the core interests of a relatively weaker state.

It is precisely this kind of calculus that underwrites New Delhi’s belief that even relatively weak nuclear forces are sufficient to deter China—because so long as India’s nuclear capabilities present more than just token opposition, and so long as Beijing cannot be certain that it can interdict India’s nuclear reserves successfully and that a weaker India will always surrender rather than retaliate when faced with significant nuclear threats, China will in all likelihood be deterred even in dyadic encounters characterized by a substantial asymmetry in relative nuclear capabilities. The late General Sundarji captured both components of this calculus succinctly when he wrote that because of India’s weaknesses, “an Indian planner may not have the degree of assurance that he would like about the survival of the Indian second strike. However, with . . . [the] . . . deployment [of a force-in-being], no Chinese planner can be certain that no Indian second strike will survive, [especially if the residual elements] . . . could devastate a few major Chinese cities. [In such circumstances] there will be enormous reluctance [in Beijing] to go in for . . . a . . . first strike. That is what deterrence is all about.”\textsuperscript{585} Corroborating this insight further—and with more subtlety—K. Subrahmanyam noted that “India believes that in the present circumstances, there are very few objectives—political, strategic, economic—or ideologi-

\textsuperscript{584} The term is Edward Rhodes’ and is cited in Goldstein, “Robust and Affordable Security: Some Lessons from the Second-Ranking Powers During the Cold War,” p. 488.

\textsuperscript{585} Sundarji, “Indian Nuclear Doctrine—I: Notions of Deterrence.”
cal reasons for which nations would be willing to accept [the] sacrifi-
cence of [even] two or three cities and, consequently, [the] projection
of a capability to inflict that much hurt should deter any nation." 586
It is important to note that Subrahmanyan is not asserting that the
ability to interdict "two or three cities" always suffices for purposes
of deterrence but merely that "in present circumstances" there are
"very few" situations facing India that would require nuclear forces
capable of inflicting greater levels of damage.

The logic underlying Sundarji's vision of "deterrence of the strong
by the weak" is therefore not centered on the claim that aggression
by a stronger power will invariably be met by a certain response that
inflicts equivalent levels of damage. Rather, it is predicated on the
inherent uncertainty that the stronger power must always feel when it
attempts to gauge both the kind of response that the weaker state
might issue in a situation of extreme adversity and the high absolute
costs even a ragged response would embody if it involved the use
of nuclear weaponry. Any rejoinder to this argument based on the
relative efficacy of thermonuclear versus other types of nuclear weapons
risks missing the point. Indian security managers are well aware
of the enormous differences in destructive capability inhering in
different types of nuclear weaponry. They clearly recognize that
thermonuclear weapons, with their vast destructive power, make splen-
did deterrents and that these weapons would perhaps be desirable if
they could somehow be acquired today without the political costs
associated with renewed testing. They would argue, however, that
thermonuclear weapons, however advantageous they may be, are
still not strictly necessary because even simple fission weapons could
inflict all the damage required to enforce restraint on the part of a
stronger state in the specific political circumstances India faces. 587
Restraint in this instance does not derive from the claim that India's
simple fission weapons can destroy whole cities—they cannot—but
rather from the fact that they will inflict enormous fatalities far out of
proportion to the value of the disputed issues even if the cities tar-

586 K. Subrahmanyan, "Articulating Our Nuclear Policy," Economic Times, June 15,
1994.

587 The clearest and most explicit statement to this effect can be found in Sundarji,
"Indian Nuclear Doctrine—I: Notions of Deterrence," and in Sundarji, "Imperatives of
Indian Minimum Nuclear Deterrence."
geted by these weapons are not “entirely” destroyed as a result. Indian strategists have often pointed out in private conversations that the density of population concentrations in modern Chinese and Pakistani cities is often greater than that found in central Hiroshima and Nagasaki. Consequently, even the most pedestrian devices existing in the Indian arsenal today—simple fission weapons with yields of 12–20 kt—would cause much greater levels of death and injury than the atomic bombings in Japan even if large portions of the targeted Chinese and Pakistani cities remained immune to the lethal effects of India’s nuclear weapons. Any nuclear use that involved multiple—spaced—detonations of simple fission weapons on a single countervalue target would only magnify these casualty levels.\footnote{Sundarji, “CTBT and National Security: Options for India.”}

That deterrence might be successful because of the inherent lethality of nuclear weapons was well understood by the advocates of minimum deterrence even during the Cold War. In fact, these advocates, basing their claims on the horrendous destructive power embodied by the thermonuclear weapons present in the arsenals of all the established nuclear weapon states, often argued that small nuclear inventories were more than sufficient for strategic deterrence so long as the weapons and their associated delivery systems were survivable in terms of some standard measures used in operations analysis.\footnote{Nicholas Wheeler, “Minimum Deterrence and Nuclear Abolition,” in Regina Cowen Karp (ed.), Security Without Nuclear Weapons? (Oxford, UK: Oxford University Press, 1992), pp. 250–280.} Some Western analysts, carrying this logic over to the Indian subcontinent, have argued that “where nuclear weapons are in play, [successful] deterrence requires only creating . . . ‘first-strike uncertainty’”—that is, a situation where “one need only cause the adversary to worry that his first-strike may be less than fully successful.”\footnote{Avery Goldstein, “Scared Senseless? The South Asian Nuclear Tests,” E-Notes (Philadelphia: Foreign Policy Research Institute), June 5, 1998.} This argument, replicating Sundarji’s earlier claim, implies that India’s modest nuclear reserves could provide stable and effective deterrence even against more powerful adversaries like China because the “absolute amounts of punishment that can be threatened are more important than [the] relative numbers of warheads or
launchers."\textsuperscript{591} Although this formulation does not explicitly say so, it effectively implies that the types and numbers of weapons involved are less relevant for effective deterrence because so long as an adversary cannot be "COMPLETELY sure about the exact number and location of the [opponent's] nuclear forces and the effectiveness of [his] planned attack, the fear of devastating retaliation will continue to exert a powerful inhibiting effect on a decision-maker contemplating the use of military force in ways that risk escalation."\textsuperscript{592}

Such arguments are logical prima facie because they highlight the powerful inhibiting effects that nuclear weapons can have on the war-or-peace calculus of states. They do not, however, establish that the relative balance of capabilities can be neglected in any standoff, irrespective of whether this balance is measured in terms of the numbers or the types of weapons involved. To be sure, many of the details pertaining to the nuclear balance can be less than arresting in peacetime because in the absence of strong political pressures, decisionmakers would most likely be hobbled by the kind of "first-strike uncertainty" that may be assumed to exist were they to fantasize about unleashing any unprovoked nuclear attacks "out of the blue." In the context of a crisis, however, an entirely different calculus could come into play: While security managers, pressed by the acute demands of necessity, might recognize that one consequence of "first-strike uncertainty" may be self-restraint leading to peace, they would also be forced to ponder the possibility that their self-restraint might result in preemptive attacks by an adversary. Such preemptive attacks would in fact be likely were an adversary, perceiving war to be a distinct possibility, to conclude that striking first was preferable to striking second. In other words, even if high levels of first-strike uncertainty were to exist in a given situation, preemptive nuclear attacks might still be deemed rational in the context of a crisis if an adversary were to conclude that striking first—even if only ineffectively by some notional standard of a "splendid" first strike—left it better off than waiting to absorb an attack that might be mounted by its antagonist. The optimists who propose a sufficiency criterion based on first-strike uncertainty alone often underestimate the acuteness of political pressures that could materialize in a crisis. These pressures

\textsuperscript{591}ibid.
\textsuperscript{592}ibid.
could force a state to initiate nuclear war even if such attacks could not effectively disarm its adversary's nuclear capabilities. So long as an initiator believed that war is inevitable and that striking first left it better off than striking second, initiating even a nuclear war could be a rational endeavor despite the high absolute levels of harm that would be sustained as a result of such an action.

If the adversary "forced" to "go first" in such a situation turned out to be China—purely for the prudential reason of limiting damage to itself in the context of some future Sino-Indian crisis—the fact that both Beijing and New Delhi were hobbled by high degrees of first-strike uncertainty in peacetime would be of comparatively little consequence where crisis stability was concerned. It is precisely in this context that the relative weakness of the Indian nuclear deterrent becomes a critical issue, because while the pressures leading to preemptive attack can materialize in any situation involving nuclear powers, they are (it is hoped) more effectively muted in those situations where even constrained preemption always and unambiguously invokes an "obviously dire, devastatingly clear and absolutely inescapable" counterresponse. The inevitability of such a counterresponse is best personified by the presence of thermonuclear weaponry, because even a relatively small number of these residual weapons can effectively devastate most organized societies; consequently, it is not surprising that these instruments, which existed in large numbers during the Cold War, lent credence to the key claims of many Western devotees of minimum deterrence. Given that New Delhi lacks comparable capabilities in terms of both the types and the numbers of weapons involved, the critical question from the perspective of deterrence sufficiency is whether India's simple fission weaponry would suffice to deter manifestly stronger adversaries like China in the context of an acute future crisis. In effect, this issue boils down to asking whether India's relatively modest nuclear capability would be able to prevent the worst imaginable outcome—a massive Chinese preemptive attack conducted with thermonuclear

593 Shlapak and Thaler, Back to First Principles, p. 16.
weapons—even if all that New Delhi could offer in return would be a ragged nuclear response that sufficed only to partially destroy “two or three cities” of importance to Beijing. Obviously, India may be able to inflict even higher levels of pain in practice, but Subrahmanyam’s metaphor of holding “two or three cities” at risk allows the question to be posed in its starkest and most illuminating form: Can a force-in-being capable of destroying only two or three Chinese cities suffice to deter Beijing in a future crisis with New Delhi?

Surprising as it may seem, the answer to this question today is a qualified “yes”: New Delhi’s nuclear deterrent, despite its presumed modesty, ought to be able to deter even an overwhelming Chinese preemptive attack in the context of a crisis not because of its ability to inflict horrendous retaliatory pain on Beijing but because the high absolute, albeit not overwhelming, levels of damage that even India’s smaller nuclear weapons could inflict when employed in a counter-value mode would be far greater than the value of the assets China sought to secure through the use of force—especially any force that either involves nuclear employment or carries within it the potential for escalation to the nuclear level. The Indian force-in-being, when more mature some ten years from now, should thus be potentially sufficient not because of its intrinsic lethality, which will remain quite modest, or because it is superior in terms of the balance of capabilities vis-à-vis China (it is not) but only because even after absorbing a first strike it will be able to inflict more damage on China than any victory in the current political disputes with India is worth. Stated differently, there are simply no political issues at stake in the Sino-Indian dispute that would make the loss of even two or three Chinese cities palatable to Beijing, irrespective of what happens to many more Indian cities as a result of the probably asymmetrical nuclear exchange that would unfold between these two competitors. Despite its relative weakness, the modest Indian deterrent could therefore suffice so long as China does not become a rapacious political entity willing to accept any amount of nuclear punishment simply to seize control over territories it claims as its own and so long as New Delhi does not seek to conquer new territories that currently lie either unclaimed or outside the domain of its effective control. Since both China and India are currently status quo powers at least with respect to the territorial disputes that engulf them, neither state is likely to pursue any military action that would either involve the
employment of nuclear weapons or embody any real prospect of escalation to nuclear use. The challenge of crisis instability, with all the attendant problems of preemptive-strike temptations, is thus neutralized in the Sino-Indian context simply by virtue of the political pressures on both sides to avoid any recourse to force—particularly because there are no worthwhile strategic objectives that could be secured through the application of coercive instruments, including nuclear weapons, that might be used in either a premeditated or an anticipatory way. Since India’s nuclear weapons have mostly political functions in this context—meaning that they exist principally as insurance against the remote possibility of miscalculation by Beijing while simultaneously serving to bolster political resolve in New Delhi—the modest nuclear capabilities that India will evolve over time should suffice for purposes of deterrence stability even against a stronger power like China.

This preliminary judgment about the sufficiency of the Indian deterrent thus falls squarely between the claims made by two competing schools in the West. The optimists argue that nuclear weapons simpliciter, with their horrendous destructive power, ought to suffice for effective and stable deterrence in South Asia simply because first-strike uncertainty makes all nuclear attacks improbable.\textsuperscript{595} The pessimists, in contrast, argue that India’s minimum deterrent would be ineffective vis-à-vis stronger adversaries like China because the balance of capabilities and the inequalities in the exchange of punishments favor Beijing, thereby confronting India with the unpalatable prospect of either facing disarming nuclear attacks or simply being self-deterred as a result of its own weakness.\textsuperscript{596} The judgment advanced here falls between these two positions: It credits the Indian force-in-being with potential sufficiency because of the specific political objectives serviced by these weapons in the unique circumstances India faces in its competition with both Pakistan and China. It does not derive this expectation of sufficiency simply from the fearsome quality of India’s nuclear weaponry, nor does it decry the deterrence potential of this force-in-being simply because it turns out to be admittedly modest in comparison to China’s nuclear arse-

\textsuperscript{595}Hagerty, “The Consequences of Nuclear Proliferation: Lessons from South Asia,” pp. 171–196.

\textsuperscript{596}Jones, \textit{From Testing to Deploying Nuclear Forces}, pp. 3–8.
nal. Rather, it argues that the force-in-being as it is currently conceived could be sufficient for India because it meets needs that are specific to New Delhi in a way that the optimists and certainly the pessimists do not always fully appreciate.\footnote{The most prominent Indian hawk who appears to have accepted this conclusion is Chellaney, "After the Tests: India’s Options," pp. 105–108; the most prominent dissenter among Indian hawks remains Karnad, "A Thermonuclear Deterrent," pp. 108–149.}

The judgment that India’s nuclear weaponry will successfully deter even stronger adversaries like China—in all the political circumstances deemed to be relevant to New Delhi—must therefore not be confused with the arguments advanced by Western devotees of minimum deterrence during the great strategic debates of the Cold War. This is an important point that must be borne in mind when the sufficiency of the hypothesized Indian deterrent is assessed. Most influential Indian elites, especially analysts like K. Subrahmanyam, Jasjit Singh, and other high-level officials in the Ministries of External Affairs and Defence (and even the late General K. Sundarji), believe that the confidence placed in India’s modest deterrent derives not from the vast destructive power of nuclear weapons per se—because New Delhi may not possess the most ruinous devices imaginable—but rather from the costs that would be imposed on an adversary by even modest Indian nuclear use in relation to the political benefits that adversary sought to attain. This qualifier is essential to the success of the Indian variant of “deterrence of the strong by the weak” because it includes an inference that should be of importance to policymakers in the United States: New Delhi’s emerging force-in-being, far from serving as a permanent solution for all time and against any imaginable adversary, is a narrow and specific antidote developed to further only those political interests thought to be both currently and prospectively at stake in the various South Asian disputes.\footnote{This is a point that is often overlooked in India, with the result that justifications for thermonuclear weapons only become “unavoidable if India is to deploy a nuclear triad as envisaged by the nuclear doctrine . . . [that is] . . . not country-specific but possesses an all-azimuth character.” See Chari, “Weaponisation and the CTBT.” This argument, of course, raises the question of whether India requires an all-azimuth nuclear capability to begin with for purposes of its security.}
In the context of China specifically, the modest Indian deterrent is premised on the belief that three critical asymmetries currently exist in favor of New Delhi.

First, the essential asymmetry of interests: India values the disputed territories it currently occupies because of their greater intrinsic worth to New Delhi more than China values the recovery of such territories through any use of force, including the employment of nuclear weapons.

Second, the essential asymmetry of capabilities: India can defend the disputed territories it currently occupies through conventional means alone, in contrast to China, which cannot reacquire these territories through use of comparable instruments.

Third, the essential asymmetry of resolve: India is likely to defend the territories it currently occupies with far greater resolution than China is inclined to display in recovering them, especially if any recovery operation involves the prospect of initial or eventual nuclear weapon use.

Despite Beijing’s great advantage in nuclear capabilities, it is therefore not at all evident—given the kinds of asymmetries existing in India’s favor—that China’s advantages would actually have great utility in the face of the mismatch between the small contested objectives and the truly enormous power inherent in its strategic weaponry. Because the tensions in this mismatch would only be accentuated by the presence of even a modest Indian retaliatory force, it is not at all surprising that most Indian security managers, echoing the conclusion reached earlier, express confidence that their admittedly weak nuclear capabilities should suffice for purposes of deterrence in the specific conditions governing current and prospective security competition in Southern Asia.

The belief that even a relatively weak Indian deterrent will suffice to dissuade a stronger nuclear power like China is obviously not an absolute claim—i.e., one that holds with no exception—but rather an assertion that holds only so long as:

- Sino-Indian relations do not degenerate into high-intensity, zero-sum security competition across the board and in all issue areas;
• New Delhi continues to maintain existing levels of conventional superiority along the Himalayan border and in the Indian Ocean;

• India does not acquire any extended deterrence commitments along the "outer ring" of its traditional defensive periphery; and

• China remains a relatively risk-averse entity focused on internal economic regeneration rather than on the muscular pursuit of irredentist claims abroad.

If these conditions continue to obtain, India should be able to deter even a stronger adversary like China with a relatively limited nuclear force simply because the disputes between the two countries ultimately do not lend themselves to being advantageously resolved by the exploitation of nuclear assets on either side. When this fact is coupled with other stabilizing variables, such as uncertainty about India's true nuclear capabilities (especially as these appear to decisionmakers in Beijing and Islamabad), the opaqueness of India's nuclear assets (and the useful first-strike uncertainty resulting therefrom), and the fact that even relatively small Indian nuclear weapons could inflict far greater damage than the objectives sought by any competitor are worth, the viability of the modest Indian nuclear force only becomes more plausible, especially in a political environment that is increasingly defined by a strong and growing aversion to any nuclear use whatsoever.\footnote{Not surprisingly, then, India will continue to support all international, including U.S., efforts to strengthen the existing "nuclear taboo." For a useful discussion of the sources and durability of this phenomenon, see T. V. Paul, "Nuclear Taboo and War Initiation in Regional Conflicts," \textit{Journal of Conflict Resolution}, 39:4 (December 1995), pp. 696–717.}

When viewed from a theoretical perspective, there is no doubt that this expectation of deterrence stability incorporates much lower levels of sufficiency, at least in comparison to the classical framework developed during the Cold War. Where the two superpowers were concerned, stability essentially derived from the certainty of nuclear retaliation, which in turn inevitably implied all-out—mutual—societal destruction through war. When second-rank nuclear states were arrayed against a superpower, a different criterion of sufficiency obtained: Stability derived from the uncertainty of retaliation on the part of the weaker power, which would nonetheless involve the
meting out of high levels of absolute punishment. Deterrence involving third-rank proliferants such as India, Pakistan, and North Korea, which may have to contend with asymmetrically stronger nuclear powers in the foreseeable future, is likely to incorporate even weaker requirements relating to strategic sufficiency. Stability would still hinge on the uncertainty of retaliation on the part of the weaker state, but the levels of punishment inflicted may not even be high in absolute terms but only in comparison to the value of the disputed objectives the stronger adversary seeks to attain. Of course, there is no reason why, in any given case, the levels of punishment inflicted could not be both high in absolute terms and greater than the value of the disputed objectives simultaneously. But even if this condition does not obtain, the success of the deterrence posture will in these instances be measured not so much by the size and quality of the nuclear forces possessed by the weaker states or even by the relative nuclear balance obtaining across any given dyad—although both of these variables will continue to be relevant in specific ways—but rather by the ability of the weaker power to prevent the stronger adversary from embarking on a course of action that could result in an outcome that is far costlier than the value of the objectives sought to be secured by nuclear coercion or the use of force. One scholar captured this logic eloquently in the following words:

> Though both potential aggressor and victim are inhibited by the attendant risks in any confrontation between nuclear states, the key point about the robustness of the nuclear deterrent strategy [referring to the “deterrence of the strong by the weak”] is that it succeeds insofar as it makes it difficult for the aggressor [meaning the stronger nuclear power] to “go first.” Where the victim is a nuclear power and cannot be completely disarmed, the onus of initiating a sequence of events that contain the possibility of disaster falls to the aggressor and exerts a powerful dissuasive effect. . . . Given incomplete information, the autonomous risk of disaster enable[s] a [weaker nuclear] power to deter a [superior] adversary. It instill[s] in the latter the fear of catastrophic nuclear retaliation despite its obvious irrationality given his clear superiority in limited nuclear options and the impossibility of the victim ever deliberately choosing the outcome of mutual nuclear suicide.\(^{600}\)

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In his study *India’s Nuclear Bomb*, George Perkovich summed up the application of this logic in the Indian context when he stated that instead of building redundant nuclear arsenals on hair-trigger alert in the name of *certain* mutual destruction, the few Indians who attended to these issues believed that it was adequate to make an adversary *uncertain* that nuclear threats or attacks on India would *not* be met with nuclear reprisals. Nuclear weapons pose such horrifying threats, they argued, that this approach was adequate to deter a rational adversary. No greater capability would deter an irrational adversary.\(^6\)

The continuing viability of this logic in the perception of Indian security managers highlights a critical element that ought not to be forgotten when the sufficiency of the Indian deterrent—or any other deterrent, for that matter—is examined. Nuclear deterrence is first and foremost a political phenomenon, not an abstract system of exchanging punishments designed by and for theorists residing in the rarefied atmosphere of a think tank. What constitutes sufficiency among new nuclear proliferants will therefore be influenced by the results of systems analysis but not determined by them. As Sundarji noted, there is a world of difference between what is required to ensure effective deterrence when measured by “a realistic political approach as against think-tank simulations.”\(^6\) In this “second coming of the nuclear age,”\(^6\) when there exist high and ever-rising thresholds of nuclear use, states are likely to be even more sensitive than usual to the purported need for large nuclear arsenals, especially when these arsenals are considered necessary to address potentially problematic issues such as graduated escalation or nuclear war fighting.\(^6\) Since political requirements rather than the abstract

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601 Perkovich, *India’s Nuclear Bomb*, p. 3.
603 This phrase is borrowed from Iké, “The Second Coming of the Nuclear Age,” p. 119.
604 Even during the Cold War, there was considerable skepticism among U.S. policymakers about the viability of such strategies despite the fact that the United States felt condemned to seek limited targeting options in order to minimize the catastrophe resulting from deterrence breakdown. As former Secretary of Defense Harold Brown once noted, “Counterforce and damage-limiting campaigns have been put forward as the nuclear equivalents of traditional warfare. But their proponents find it difficult to tell us what objectives an enemy would seek in launching such
claims of systems analysts are more likely to condition future notions of strategic sufficiency, political decisionmakers in newly proliferating states such as India will be extraordinarily sensitive to both context and costs where issues pertaining to the acquisition, deployment, and use of nuclear weapons are concerned. Because the value of these weapons "lies almost exclusively in what they help to avoid, rather than in what they can accomplish," the pursuit of any political goal involving the prospect of even a single nuclear weapon going off in anger is only likely to dampen—not heighten—the enthusiasm of state managers for securing these objectives.

It is precisely this condition that makes the Indian force-in-being a viable instrument of statecraft for certain narrow and clearly defined purposes such as increasing political confidence, preventing blackmail, and deterring nuclear use in the context of the relatively low levels of security competition with Pakistan and China. To that degree, the size, structure, and disposition of the evolving Indian arsenal must be clearly viewed as a circumstantial product that may not subsist as a stable equilibrium in perpetuity. This, in turn, implies that if the force-in-being currently desired by New Delhi is to survive more or less as a permanent end state, the three conditions referred to in earlier chapters would have to persist indefinitely. These include the gradual diminution in nuclear inventories worldwide coupled with high and ever-rising thresholds of nuclear use; the continued maintenance of robust U.S. hegemony; and the durable persistence of an offense-dominant global nuclear regime. All three conditions are critical for ensuring that New Delhi will remain satisfied with nuclear sufficiency even at low force levels.

The gradual reduction of nuclear arsenals worldwide remains an important evidentiary instrument testifying to the commitment of the Permanent Five to norms of global equity and their legal obligations under Article VI of the NPT. More important from New Delhi’s perspective, it creates the structural preconditions that actually enhance Indian security under regional conditions while increasing India’s status in the global order. The continued reinforcement of the campaigns, how these campaigns would end, or how any resulting symmetries could be made meaningful.” See Harold Brown, Department of Defense Annual Report, Fiscal Year 1980 (Washington, D.C.: USGPO, 1979), p. 76.
603 Shlapak and Thaler, Back to First Principles, p. 9.
tradition of nuclear nonuse additionally contributes to making the threats of nuclear employment against India even more remote and, by implication, further diminishes the necessity for New Delhi to contemplate dramatically enlarging its capabilities or engaging in heroic measures to cope with such contingencies.606

The continued maintenance of robust American hegemony also contributes to this outcome, but via a different route: It guarantees that India’s regional competitor, China, will never become a preponderant power capable of coercing its neighbors without fear of countervailing responses mounted by the United States in Asia or beyond. To the degree that Indo-American relations also improve over time, it bequeaths to New Delhi all the deterrence advantages accruing from closer Indian collaboration with the most important power in the international system. Continued U.S. hegemony, in fact, ensures that the United States will be able to provide explicit or tacit extended guarantees to all states that may be threatened by a powerful and possibly bellicose China in the future while simultaneously allowing those states which may not seek such guarantees to enjoy them nonetheless because of the positive externalities created either by American deterrence of all its major and steadily growing rivals or by the promotion of a local Asian balance of power under the overall aegis of American hegemony at the core of the global system.607

Finally, the durable persistence of an offense-dominant global nuclear regime ensures that even relatively weak Indian nuclear forces will always be able to reach their targets in China and Pakistan without excessive difficulty. A shift to a “thick” defense-dominant nuclear

606 Many of these issues are discussed in Perkovich, India’s Nuclear Bomb, pp. 464–468.

607 This is a point that Indian policymakers clearly recognize but are loath to admit publicly because they fear that continued American hegemony might turn out to be an impediment to the multipolarity that promises to assure India a role at the core of the global system. For this reason, Indian policymakers and analysts are more likely to argue for the creation of an Asian balance of power in which India becomes a prominent actor. For further details, see Ashley J. Tellis, “The Changing Political-Military Environment: South Asia,” in Zalmay Khalilzad, David T. Orletsky, Jonathan D. Pollack, Kevin Pollpeter, Angel M. Rabasa, David A. Shlapak, Abram N. Shulsky, and Ashley J. Tellis (eds.), The United States and Asia: Toward a New U.S. Strategy and Force Posture (Santa Monica: RAND, 2001). See also Deepa M. Ollapally, “India and the New ‘Asian’ Balance of Power,” Strategic Analysis, 22:4 (July 1998), pp. 515–526, and K. Subrahmanyam, “Son of Star Wars,” The Times of India, February 12, 2001.
regime, on the other hand, would require greater exertions on New Delhi’s part to ensure continued penetrativity of its strategic weaponry and, over time, may also require that India both improve the quality and increase the numbers of its nuclear weapons and delivery systems to levels far greater than were originally intended as part of the force-in-being.  

To the degree that the offense-dominant global nuclear regime stays more or less intact, all the pressures for producing a larger, more capable, and more diversified Indian nuclear force will also remain relatively muted.

Should any of these three variables change systematically over time, the size, complexity, and character of the Indian force-in-being would also be progressively transformed. This would be particularly true:

- if China emerged as a true superpower in the future and, as a result of its changed status, dramatically expanded its strategic nuclear capabilities and transformed the current conventional balance vis-à-vis India to New Delhi’s disadvantage;

- if Sino-Indian competition intensified over time as a result of growing national capabilities in both states and if the resulting struggle for power were to generate a high-intensity contest for influence in the middle eastern, southern, and southeastern rimlands of the Asian continent;

- if Sino-American relations were perceived in New Delhi as taking the form of coercive collusion manifested either through joint efforts at “ganging up” against India on political-strategic issues or through greater displays of laxity toward Pakistani efforts at increasing its strategic capabilities through proscribed international transactions; or

- if international politics were once again to radically change course and move in the direction of greater nuclearization and even stronger forms of dependence on nuclear weapons for ensuring order and security.

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If such circumstances come to pass, the Indian nuclear posture would change and could evolve into something resembling a traditional arsenal. In fact, the genius of the force-in-being is that it allows for such change to take place in a relatively evolutionary fashion. This is because the posture currently favored by India’s security managers does not prevent the country from continually improving its delivery capabilities, supporting infrastructure, and procedural systems to levels that could support a variety of nuclear strategies other than delayed retaliation focused on simple punishment. Nor does it prevent India from continuing to accumulate weapons-grade plutonium and any other special nuclear materials that its evolving arsenal might need in the near term; in fact, depending on the final text of the FMCT, it is even possible, although not likely, that India and all other states might be permitted to continue producing fissile materials, albeit with the stipulation that all post-FMCT stocks of such material be maintained under safeguards. If such a position is actually agreed to in the Conference on Disarmament, India could continue to produce fissile materials, and these materials would remain in its custody, albeit under safeguards, and would be available to the Indian state for any purposes in an emergency. Even if this position does not survive the current negotiations relating to the FMCT, the fact remains that such a treaty is years away from completion, and given India’s current refusal to accept a moratorium on the production of fissile materials, New Delhi could—and will—continue to produce weapons-usable nuclear materials until the last possible moment until prohibited from doing so by a multilateral FMCT.

The currently favored strategic posture also does not prevent the continued improvement of India’s nuclear weapon designs through computer simulations and subcritical tests, and ultimately it would not prevent New Delhi from breaking out of any treaty commitments—assuming it signed on to the FMCT and CTBT in the first place—that prohibit either the production of fissile materials or the resumption of field testing for purposes of developing a larger number of more potent nuclear weapons.609 As Indian Prime Minister

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609 Senior Indian policymakers have already indicated that India could withdraw its unilateral moratorium on explosive nuclear testing should that action comport with its national interests. See “India Can Still Conduct N-Tests, Says Jaswant,” Indian Express, November 25, 2000.
Vajpayee noted in connection with the latter issue, “India could [always] carry out more nuclear tests if it perceived any threat to its national security in the future. There is nothing new about it. There is a provision in the CTBT . . . that if any country feels there is a threat to its security, it can act outside the provisions of the CTBT.” The solution embodied by the force-in-being thus carries within it the potential for transformation into some other, more lethal kind of nuclear posture—like a more robust force-in-being or different variants of a ready arsenal—if changes in India’s strategic circumstances were to mandate that it embark on such a transition. In that sense, the force-in-being represents a continuation of the classic Indian preference for “keeping the option open.”

What is never explicitly stated by Indian security managers but is always on their minds is that the currently favored solution represented by the force-in-being serves the specific purpose of ensuring Indian security in conditions that are best described as being “between the times”—that is, between the first nuclear era defined by the Cold War and the still-unclear but emerging reorganization of the international system. If the global order were really to change in a direction manifestly unfavorable to India, personified most simply by China’s rise as a threatening superpower, Indian policymakers expect that the currently strong wave of American nonproliferation pressures on New Delhi—one of the factors that in fact contributes to maintaining their nuclear capabilities in the form of a force-in-being—would steadily abate and that India would then be free for the first time to return to the business of developing a more robust nuclear posture of the kind the altered strategic environment required. Under these conditions, they expect that the current U.S. attitude toward nuclear weapons may itself change and that Washington may return to emphasizing the acquisition of even more robust nuclear capabilities than are currently deployed by the United States.

Should such circumstances come to pass, whatever commitments India may have made in the interim to global regimes like the CTBT and the FMCT would slowly become irrelevant—just as U.S. com-

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mitments to the ABM treaty threaten to become irrelevant today—and New Delhi could find itself obligated to change course simply to ensure its national security in the new strategic environment. If and until such a point is reached, however, the force-in-being is seen to serve India well—just as “maintaining the option” served it well for over two decades—and this solution will in all likelihood subsist as the new “punctuated equilibrium” for some time to come: a stable way point, but not a permanent terminus in India’s slow maturation as a nuclear weapon power.

As Figure 19 graphically illustrates, the history of the Indian nuclear weapon program has in fact been little more than a series of sequentially punctuated equilibria. And if the past is any guide, the defining changes in the character of India’s currently preferred nuclear posture—although likely to materialize only after an extended
period of time—will likely be triggered by some sharp, specific external or internal stimulus that cannot yet be discerned with any clarity. What U.S. policymakers and the intelligence community can do in the interim, however, is continuously monitor the nature of the ongoing Indian strategic debate, especially with respect to the following questions, because the dominant answers accepted to these queries in the "official mind" of policymakers and strategic managers in New Delhi will—even more than technical intelligence about India’s strategic programs—illuminate the prospect for future changes in India’s nuclear posture:

*What does effective deterrence entail in terms of the numbers of nuclear weapons?*

*What does effective deterrence entail in terms of the quality of nuclear weapons?*

*What does effective deterrence entail in terms of the numbers and quality of delivery systems?*

*What is the “dominant” solution to the problem of strategic force survivability?*

*How slow can “delayed retaliation” be without imperiling deterrence stability?*

*How formal do C³I systems have to be for effective deterrence?*

*How important is military custody of nuclear weapons in peacetime for effective deterrence?*

*Is stable deterrence best served by certainty or uncertainty of strategic outcomes?*

Depending on how the answers to these questions change over time, the Indian strategic posture could mutate—and although previous discussions posited a ready arsenal as the “ideal-typical” alternative strategic managers in New Delhi might favor, this choice, like any other, may never be publicly announced or deliberately selected but may instead appear simply as the end point of a long process of creeping weaponization. It is thus worth noting—more from a policy standpoint than from a theoretical perspective—that there are some intermediate positions India may pause at along the way. If, for
example, the currently favored posture is that of a force-in-being—that is, one defined by limited size, separated components, and centralized control—it is possible to imagine at least two subalternatives lying between the boundaries of a force-in-being and a ready arsenal. At one end, India could continue to settle for a force-in-being, but one that is not limited in size. This posture—a robust force-in-being—would continue to be defined by separated components and centralized control, but it would seek to incorporate the largest and most capable nuclear force India could produce before it is constrained either by bilateral agreements or by multilateral treaties. At the other end, India could opt for a modest ready arsenal—that is, a force defined by highly integrated weapons ready for prompt operations as well as by a centralized but rapidly devolving command-and-control system, yet one that is nonetheless small at least in terms of the number and perhaps types of nuclear weapons it involves. Beyond these two subalternatives, of course, lies a true ready arsenal, which may be described as a large nuclear force that is fully integrated in disposition, with centralized but rapidly devolving command-and-control arrangements.

Since it is impossible to predict whether India will choose to move directly to a ready arsenal of this kind—once it feels compelled to go beyond its current preference for a force-in-being—or even if it will choose to move in decisive as opposed to incremental steps, Table 7 identifies some of the salient indicators that will help U.S. policymakers determine the status of India’s nuclear posture as it evolves beyond its current disposition. In practice, none of these alternatives will be clearly associated with each of the indicators identified in the table—but taken in their totality, each set of indicators suggests a sufficiently different strategic orientation that warrants continued scrutiny by the United States.

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611 There are in principle many variants beyond the two alternatives discussed here. These variants can be derived by manipulating the following three variables—the size of the force, the degree of integration between weapon components, and the patterns of command, control, and custody—in different ways. The subalternatives identified here, however, are simply those believed to be most plausible in the Indian context, and no claims with respect to the exhaustiveness of all possible combinations are thereby implied.
Table 7
Signposts Indicating Future Shifts in India’s Nuclear Posture

<table>
<thead>
<tr>
<th>Variable</th>
<th>Force-in-Being (Limited inventory size; separated weapon components; centralized control)</th>
<th>Intermediate Posture I: Robust Force-in-Being (Expanded inventory size; separated weapon components; centralized control)</th>
<th>Intermediate Posture II: Modest Ready Arsenal (Limited inventory size; integrated weapon systems; centralized but rapidly devolving control)</th>
<th>Ready Arsenal (Expanded inventory size; integrated weapon systems; centralized but rapidly devolving control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fissile-material production</td>
<td>Production of weapons-grade plutonium at a traditional or marginally increasing rate in research reactors only</td>
<td>Production of weapons-grade plutonium at a highly increased rate in research reactors; use of civilian reactors for production of weapons-grade plutonium; accelerated enrichment of weapons-grade uranium</td>
<td>Production of weapons-grade plutonium at a traditional or marginally increasing rate in research reactors only</td>
<td>Production of weapons-grade plutonium at a highly increased rate in research reactors; use of civilian reactors for production of weapons-grade plutonium; accelerated enrichment of weapons-grade uranium</td>
</tr>
<tr>
<td>Nuclear weapon research, development, and production</td>
<td>Laboratory tests of nuclear weapon components; subcritical tests and other experiments</td>
<td>Resumption of hot testing for yield enhancement or for validation and weaponization of advanced nuclear designs; creation of a dedicated nuclear weapon assembly plant</td>
<td>Resumption of hot testing for validating warhead safety technologies</td>
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<td>Variable</td>
<td>Force-in-Being (Limited inventory size; separated weapon components; centralized control)</td>
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<tr>
<td>Delivery system architecture</td>
<td>Dyad plus R&amp;D on sea-based systems</td>
<td>Dyad plus R&amp;D on sea-based systems; possible nuclear deployment on surface vessels</td>
<td>Triad with SSBNs/SSGNs</td>
<td>Triad with SSBNs/SSGNs</td>
</tr>
<tr>
<td>Procedural systems</td>
<td>Improving civil-military structures for planning nuclear requirements, regulating weapon integration and crisis management, and conducting nuclear operations; unified command responsible for managing tri-service nuclear delivery systems</td>
<td>Creation of formal military-dominated structure for planning nuclear requirements and operations; military dominance in joint civil-military structures for regulating weapon integration and crisis management; creation of a dedicated nuclear command manned and controlled by the military with autonomous ownership of nuclear delivery systems and peacetime custody of nuclear weapons; or routine peacetime custody of nuclear weapons with one or more Indian armed services</td>
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