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PROMOTING STRATEGIC AND MISSILE STABILITY IN SOUTHERN ASIA

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I
LESSONS FROM THE US-USSR STRATEGIC STANDOFF

Maj. Gen. Dipankar Banerjee

Given the present strategic developments in South Asia there is an urgent need to seriously analyze ways and means of ensuring strategic stability in the region. The strong linkage of China —direct and indirect — to Pakistan's nuclear and missile programme has left its strategic footprints in this region with consequences that might have serious implications. Given this reality, there is a need to understand both misile proliferation in the region and examine possibilities of missile defence. This conference is the beginning of a process. We hope to develop this into a substantive area of research in the future for both our institutions.

Even as we attempt to understand this we need to look back to the lessons of the Cold War and the NATO-WTO stand-off durng that period.

Sir John Thomson

My own experience in nuclear and disarmament matters dates back to the 1950s. The theme of this session is strategic deterrence and promoting strategic stability. The latter is preferred because ensuring deterrence is heavily dependent on chance or accident. What lessons can be learned for contemporary relationships between China, India and Pakistan from the United States-Soviet Union stand-off? The problem in southern Asia is more complicated. The US-USSR stand-off was basically ideological. In the Asian context, there is no ideological clash involved and besides it is trilateral.

All three states have large armies as well as huge populations, which is predominantly poor. They need to consider their relationship with other great powers, particularly the US. The US and the Soviet Union did not then have to consider the relationships with other great powers. There are several reasons why the lessons from the US-USSR stand-off may not be directly relevant. There is no question of any of the three states being taken over by either of the other. Nuclear weapons generate political issues and it is not just about war fighting. The US and USSR were two *status quo* powers. Pakistan is not a *status quo* power. There is also the problem of terrorism, which will not be elaborated here. Many of the problems are inherent in the hardware such as the weapons systems and launch vehicles, but it is

the matter over the control of weapons launch that is crucial.

Who decides what is to be done and who has an understanding or misunderstanding of the situation? Who decides doctrines and who are responsible to implement them? These are the crucial questions to be looked into.

An apparent paradox during the US-USSR stand-off was the oddity of clarity between the US President's consistent decision not to use nuclear weapons after the first one. The fact that NATO kept changing its nuclear doctrine is also important. NATO's doctrine, that tactical nuclear weapons would be used changed in two-and-a-half years time, where it was decided that NATO would be the losers if tactical nuclear weapons are used. It was a very major change in thinking. This is an illustration of the many changes in nuclear doctrine during the Cold War. Despite NATO and the Warsaw Pact countries, the US and the Soviet Union were on their own and it was essentially a bilateral relationship.

An important aspect that often goes unnoticed is that the ideology of the two blocs gave some stability, because the respective ideology that they believed in convinced each that it was going to win in the end. It also kept them way apart in thinking and led to many misunderstandings. Overall it was a unique relationship.

By contrast, the constellation of powers in Asia resembles Europe in the 18th century. The US President, George W. Bush, seems to view the future in terms of classical balance of power. Historically, this system has operated in 18th and 19th century Europe. This would mean a system of shifting alliances and constant threat of war.

The most important aspect about the US-USSR stand-off was that the superpowers did not go to war. It appeared at the time that this was a result of the nuclear stand-off. However, now it seems that there would not have been an armed confrontation even without nuclear weapons. It was the solidarity of NATO which secured stability.

Strangely, in the 1950s, the two sides did not negotiate till they approached the limited area of nuclear test ban. This was because both sides did not know what the other side did not have and did not want to disclose what they had. It might show what their intentions were, and what their vulnerabilities were. By the 1960s, when negotiations began, there were so many nuclear weapons that these issues were not important, and by then people had realised that these weapons were not for war fighting.

Tactical nuclear weapons turned out to be a snare and both sides regretted having them as it is a dangerous nuclear policy. It is easier to get into an arms race than to get out of it. Neither side can stop as each one tries to catch up with the other. Linked to this, are problems arising out of vested interests in weapons programme such as political control, reliable command and control arrangements, risk of deployment, and importance of separating nuclear weapons from others. Nuclear weapons are for deterrence and for politics, not for war fighting. Therefore, they should not be integrated into war planning. If they are integrated, it is more likely that they would be used.

Ted Postol

Hiroshima was destroyed in 1945 by an atomic bomb called 'Little Boy'. Little Boy had not been tested. It had 12.5 kilo tons of explosive power, and its fire and blast destroyed everything within the radius of one-and-a-quarter miles. A nuclear weapon ought to be seen as a piece of material from the centre of the Sun. It is misleading to see nuclear weapons as any other weapon. The temperature at the centre of the Sun is 20 million degrees Kelvin and the temperature at the surface of the Sun is 6,000 degrees Kelvin. The surface of the Sun heats the surface of the Earth from 90 million miles. When a piece from the centre of the Sun — which is 20-100 million degrees Kelvin initially — is released near the surface of the Earth, it is misleading not to focus on the light and heat.

On 8 August 1945, the second atomic bomb was dropped on Nagasaki and this was a plutonium bomb that had been tested. This was a 1.2 kilo tons bomb and it destroyed everything in an approximate range of one-and-a-half mile from the detonation point. At this range, it appeared for a few hundred seconds to be brighter than a thousand Suns in a desert at noon. Events with enormous negative consequences continued and by the end of 1945, the US had tested six nuclear weapons. By 1955, the US arsenal had grown from six weapons to more than three thousand. In the next 10 years, the US arsenal had grown to nearly 30,000 weapons, enough to destroy all life on this planet.

By 1952, the 'Super Bomb' or hydrogen bomb with thermonuclear radiation was added to the US arsenal. Despite the enormous scientific lead the US had at the end of World War II, the USSR produced its first atomic bomb four years after the US did. This created a sense of terror in the US. In 1953, the USSR tested its own super bomb; demonstrating that its scientific industrial establishment had caught up with the most advanced capability of the US. In simple terms, one could argue that the US was still ahead of the Soviet Union as it had 120 nuclear weapons, whereas the US had 1,200 weapons in 1953. In spite of this imbalance, the US expanded its nuclear weapons arsenal to 30,000 nuclear weapons. The Soviet Union then expanded it to 40,000 nuclear weapons. Looking at the numbers it makes one wonder what were people thinking.

The answer to this is more disturbing; that many could understand the mindlessness of this enterprise, but could do nothing about it.

During the same time that the US and Soviet Union learnt to produce hydrogen bombs, they produced large numbers of these weapons that could yield 10 or more mega ton (1,000 kilo tons). The bombs dropped on Hiroshima and Nagasaki had a yield of nearly 10 kilotons, setting fire to everything within the range of one-and-a-half mile radius. Ten megaton nuclear weapons could set fire to range of 15-20 miles.

What could possibly justify one country's use of nuclear weapons against the other? There have been projects in the US to increase the destructiveness of weapons by carefully optimizing the targets in order to achieve credible minimum deterrence. In order to have a credible deterrent, one must convince the adversary and oneself that these

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weapons need to be used if the political leadership so decides. This is a lesson that should be taken seriously, especially by those who are in the military. It is not enough to have these weapons, but the military must have a capability of delivering them if ordered to do so. Therefore, one must create organisations capable of delivering these weapons as well as somehow demonstrate ones determination of using them, despite the paradoxes and questions they give rise to. Over time these organizations develop a culture of their own. Organisations have to take these weapons seriously and a situation arises when it becomes difficult to manage these organizations.

In nuclear warfare, there is a tendency to conventionalise these weapons. This is an intellectual debate and there are solid technical reasons why this is a mistake. The Indian position on these weapons is understandable, that they need to have credible minimum deterrence.

A recent article argued that India's minimum credible deterrence requires the ability to attack ten cities and destroy them. In order to do so, the calculations would imply; the viability of weapons, pre-emptive loss of weapons, ability to disperse, launch reliability etc, The conclusion of the numbers required reached 200 weapons. Each of these weapons must have a 200-400 kilotons range. This is 20 times larger than the bombs dropped on Hiroshima and Nagasaki. The logic is to use 200 instead of 10 if necessary. This is not a criticism of the article, but once we get into the details of planning, the size of the arsenal growsprogressively and automatically. This was the kind of logic that was used to increase the US arsenal. Lofty arguments can be made to bring up arsenal to 20,000-25,000 nuclear weapons. There is need to think about it.

Discussion

Maj. Gen. Dipankar Banerjee:
The lessons from the Cold War need a detailed analysis. In southern Asia, it is imperative to study these initiatives carefully and come to our own conclusions. Theodore Postol has highlighted the mad rush to expand nuclear arsenals in the west. In retrospect we need to ask were these numbers at all relevant? The rapid expansion of nuclear arsenals led to the doctrine of Mutually Assured Destruction (MAD). This led to a further expansion of arsenals. The credibility of the MAD doctrine assumes a certain degree of madness in the readiness to use thesse utterly destructive weapons. Simultaneously there is also an imperative to behave with utter rationality and not initiate a nuclear weapon strike. This is among several conundrums of the deterrence debate; as to what eters whom and when and how and with what ultimate results.

There is a danger that given a certain weapons availability, states would attempt to convert it into war fighting advantage. In the Indian context, it has been imbibed that a nuclear weapon can never be meant for war fighting. Hence under the doctrine of a minimum credible deterrence, a nuclear weapon remains utterly unusable. Given a setting where such weapons are available, we need to look into how to stabilise that environment.

Gen. Vohra: The foremost lesson from the US-USSR stand-off was that nuclear weapons were not weapons of war. Reagan Gorbachev together stated in 1985 stated that a nuclear war

cannot be won and must not be fought. The nuclear powers show a great deal of concern when another country possesses nuclear weapons. The only answer to this is global disarmament.

Prof. PR Chari: Why was it necessary for the Soviet Union and the US to possess thousands of nuclear weapons when even one weapon for one city would have been enough? In an article elucidating the reasons why nuclear arms race took place between US and Soviet Union, one of the reasons given was rivalry between their own armed forces. Therefore, each one wanted to grab a particular weapon for itself and ended up with the obscenity of over 50,000 nuclear weapons around the world. There is always this desire in the military for not only insurance but over insurance.

Arun Sehgal: In the US-USSR stand-off, conventional weapons stand-off would have worked. However, what impact did the frequent doctrinal change have on deterrence stability? With regard to the number of weapons and targeting philosophy, was it a purely military working figure or were there political nuances involved?

Ramesh Chopra: Now that India and Pakistan have already got into a nuclear mode, how do we get out of it? 'No first use' of nuclear weapons is India's declared doctrine and India's minimum credible deterrence brings a certainty to maximise punitive damage.

Ted Postol

There is no choice between conventional deterrence and nuclear deterrence. Make wise decisions to keep this process as minimal as possible. Pakistan has to consider that it might have to use nuclear weapons. The choice is between a yield of ten kilotons or three hundred. Various missions and interests are kept under control when one looks at the military planning process.

It is very important that civil society and the military have detailed knowledge of weapons. It is inevitable that India and Pakistan will enter this nuclear dilemma. One has to be sensitive to the fact that good, honest military persons can also become mass murderers.

John Thomson

The Cuban missile crisis had an enormous effect on both super powers and it had a stand alone effect as did the Berlin crisis. These two crises made (Strategic Arms Limitation Treaty) SALT I possible. The public opinion in the US and Europe became particularly agitated during the 1960s and 1970s, and this had an enormous effect.

Conventional deterrent and nuclear deterrent become a joint deterrent once you go nuclear. As for changes in doctrine and their effect on stability there is no good answer. But, it did not have a perceptible effect and for a long time the US and USSR did not know what each others' doctrines were. They had very different doctrines and absolutely did not agree with each other.

Rivalry in armed forces does exist and anybody who has nuclear weapons has to watch out for vested interests. The paradox is the difference between what the political leaders knew and what the military plan was.

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Air Marshal Vir Singh: The overall theme of our deliberations is stability. Two things needed for stability are communications and confidence. Nuclear weapons must not be included in our overall plans as this is not practicable. Those who are professionally engaged in planning and development of weapons develop a certain culture of their own and this has a moderating influence. Is this available in Pakistan? Conventional deterrence has always been in place. War fighting and use of nuclear weapons is very much on the cards for Pakistani planners.

Lieut General Amitav Mukherjee: Considering the fact that nuclear weapons are unusable, voices of sanity – the political elite and public opinion influencing the formulation of ground strategy cannot be left to military-political planning. As far as nuclear doctrine is concerned, it has to be under political control. Why is it that countries like UK and France are not for disarmament? In the India-Pakistan scenario, nuclear weapons have to be under strong political control.

Commander Ajay Lele: After the invasion of Iraq in 2003, use of bunker-busters and "usable nuclear weapons" has been widely debated. The US is trying to invest in conventional weapons which are nearly as destructive as nuclear weapons.

RR Subramanian: India and Pakistan cannot make 50,000 bombs as we do not have the GDP that the USA had in the1970s and 1980s.

Sir John Thomson: The power that would benefit most from complete abolition of nuclear weapons is the US as it has the strongest conventional military capability. What does an arms race mean? To take a specific point, does it mean deterring Pakistan and China simultaneously? What would Beijing and Islamabad infer from that?

Ted Postol: When there is a feeling of desperation, there is a tendency to rely on nuclear weapons. Pakistan does have a serious understanding of the dilemma that it is in. If this turns out to be an opportunity, it could be a step in promoting strategic stability. There is need for target coordination. When there is nothing to shoot at, the risks involved are considerably reduced.

Concluding Remarks

Air Marshal Asthana: There soon came a time when the US and USSR both reached a very high threshold of nuclear weapons. Very soon thereafter, they realized the folly of their logic. It must also be remembered that one of the lessons from the use of nuclear weapons in Hiroshima and Nagasaki was that it ended the war. Japan broke after the nuclear attack. Whenever there is a planned consideration for use of nuclear weapons, the threshold to break a nation's will must be taken into account.

II
MILITARY PROGRAMME IN SPACE AND THEIR IMPLICATIONS

Subrata Ghosroy

Weaponisation of Space

The discussion on space weapons assumes importance as there has been an increasing emphasis on placing weapons in the post-AM Treaty era. The difference between missile defence and space weapons is thin. In South Asia, both India and Pakistan have similar positions on weaponisation for space. There is a need to build consensus on this issue.

In the US, the drive for space weapons was a legacy of the Star Wars programme. The Rumsfeld Space Commission report published in 2000 has now become the American Space Policy. The report recommends that the US maintain an option to place weapons in space mainly to protect its space assets, deny access to space to adversaries and attacks targets in space or on Earth. The space budget has been increasing rapidly, and the Pentagon budget for the same in 2006 is approximately $22.5 billion. Of this, nearly $1 billion is spent on space weapons research itself.

Irrespective of the above policy, there is a lack of a rationale for space weapons. Space-based weapons are not cost effective in delivering payload and the technological hurdles are substantial. Besides, space weapons themselves are as vulnerable as satellites. It is also highly debatable whether North Korea would attempt to shoot down satellites, though many in the US believe so.

Some of the initiatives include transformational flight in space of the US Air Force (2004), which outlined a series of potential space weapons. This has been described as "a road map to the future." The Near-Field Infrared Experiment (NFIRE) satellite is to launch a small sensor space vehicle and measure plume characteristics of ballistic missiles in the boost phase. The Counter Communications Systems (CCS) is a transportable system designed to disrupt satellite communications and is an offensive counter-offensive system that includes means to disrupt, deny, degrade or destroy an adversary's space systems. Falcon is a dual purpose programme and XSS-11 is an experimental satellite system, to demonstrate on orbit capability of rendezvous and proximity operations.

To conclude, the military use of space is grown fully into war fighting in Iraq. Gradually, space is getting militarized much more than ever before. The push for weaponisation for space is not justifiable either for mitigation of threats, not because the technology is mature. There is near consensus worldwide for banning weapons in space. In South Asia, Indian support for the US global missile defence system would have adverse consequences. The possibility of a potential collaboration between India and Pakistan, at least at the non-governmental level needs to be explored.

William Marshall
Impact of Space Weapons

There are three space orbits – the Low Earth Orbit (LEO) 100-2,400 km, which has rconnaissance, SIGINT satellites; Medium Earth Orbit (MEO), which has navigation satellites; and Geostationary Orbit (GEO), which has Communications, early warning, (weather, sat TV). There are approximately 35 million man-made objects in space, of which there are around 2,000 satellites, of which around 1,000 are operational. There are around 11,000 space debris that are greater than 10 cm.

Space is fundamentally technologically asymmetric. It is easier to negate a space system from the ground (for the 30 states with sub-orbital access) than it is to protect one. It costs $20,000/kg to launch a satellite, and satellites also follow predictable paths. Space weapons are aimed at providing protection, defence

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and attack. Since the beginning of the space age in 1957, the USSR and US deployed a myriad number of military satellites.

The debate on space is important for the following reasons. First, there is an increasing military use of space for the purposes of early warning (of nuclear attack), communications, navigation (e.g. GPS), reconnaissance (spy satellites) and signals intelligence. Second, there is an increasing conflict over space assets. Finally, is the US policy to move forward in developing space weapons.

Of the total satellites, only two per cent are outside the US and Russia, which have a military purpose. However, operational military satellites constitute 15 per cent. In the southern Asian region, China has launched 105 satellites, of which 37 are active, while India has launched 35, out of which 15 are active. On an average, China launches four satellites per year, while India launches two satellites every year.

To conclude, satellites are crucial to nuclear stability, especially in terms of early warning. They also play an increasingly critical role in the militaries of many nations. However, they are vulnerable to attack. In South Asia, India and Pakistan have a collective interest in preventing space weaponisation.

KK Nair

China's Military Space Programme

China's space programme became prominent following Col. Yang's space sojourn. Today, the opinion is strongly divided on the nature; some perceive it as a threat and the others as militarily inconsequential. Most such perceptions / misperceptions are American or western in character.

In an Asian context, China's military space programme is of immense consequence, its rapid evolution has tilted the 'balance of power' overwhelmingly in its favour and likely to tilt the scales further in its favour.

Apart from the fact that China's space programme is one of the least publicized in the world, is the aspect that it has largely succeeded in shrouding its military space programme under a cloak of secrecy and civilian nomenclatures. The nature of space technology and the overlapping characteristics of China's military and civil space programme permitted the parallel development of a missile programme and a space launch vehicle. From it's beginning in the 1950s, China has adapted its ballistic missile programme into major space programme. Its space programme was primarily an offshoot of its ballistic missile programme. The development of ballistic missile technology had initially triggered China's interest and growth in space. In the early years, China's missile programme was given priority and the space assets came about as derivatives of these projects. Early Chinese space endeavours were based upon its ballistic missile rocket technology. Once China achieved proficiency in space launch technology, it diversified to develop its satellite applications, particularly in a military context. Much of China's space programme is deemed to be civilian, but have dual use, especially with regard to military capabilities. These developments were initially meant to fulfil the 'force-enhancement' (or *informationalisation* in Chinese parlance) missions of surveillance and reconnaissance, communications, navigation, ELINT (Electronic Intelligence), etc., and

following a certain amount of maturisation in these roles, China has gradually moved onto dedicated satellites for military purposes as well as 'space-control' (or *battle-field combating*) mission programme by developing ASAT (Anti–Satellite), space-based ISR (Intelligence, Surveillance, Reconnaissance) and other counter-space developments. From its very beginning, the conceptualization, design, and evolution of China's space programme has always had a pronouncedly military orientation and consequently, its overall control has always rested with the Central Military Commission.

Even as Beijing publicly declares that space should not be militarized and that space technologies should be used for peaceful purposes, military considerations play an important role in China's space programme, owing in part to the programme's military beginnings. For instance, China's three stage CZ-1 (*Chang Zheng*-1/ Long March-1) SLV (Space Launch Vehicle) is a derivative of the military's DF-4 (*Dong-Feng*/ East Wind-4) ballistic missile. Likewise, versions of the DF-5 have also become SLV's, specifically the FB-1 (*Feng Bao*/Storm-1) and the contemporary Long March (CZ-2) used to launch satellites and the *ShenZhou* series spacecraft. In fact, the technologies used for Long March and Chinese ICBMs (Inter Continental Ballistic Missiles) were so similar that in 1998, the US Senate select committee on intelligence warned that technical assistance once provided by US companies to improve China's Long March rockets may have inadvertently threatened US national security by improving the accuracy and reliability of China's ICBMs targeting the US. Also, the Chinese firm that launches Long March, the China Great Wall Industry Company, has been sanctioned by the US government for missile proliferation.

The dual-use potential of the Chinese space programme is not limited to civilian rocketry and military missiles. Broadly speaking, China's space programme objectives by 2010 include, creating an integrated military and civilian earth observation system; building a Chinese-operated satellite broadcasting and telecommunication system to be used for both civilian and military purposes and which would finally be used to link China's military forces; establishing a Chinese-run GPS (Global Positioning System) and upgrading China's Long March rocket, while continuing to develop a low cost successor.

With regard to military communications, since the PLA (People's Liberation Army) was allotted only limited channels amongst China's eleven communication satellites, it attempted to rectify the situation and proposed a network of defence communication satellites. Its FH-1 (*Feng Huo*-1) military communication satellite (first of the series) was launched in January 2000, which consists of the *Qu Dian* C^4I (Command, Control, Communications, Computers and Intelligence) system. The network as per its registration with the ITU (International Telecommunication Union) would consist of up to five satellites, China Sat 21-25. This network would enable PLA commanders to communicate with their in-theatre forces in near real time, and also enable data transfer with all units under joint command, in addition to providing the Chinese

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military with a high speed and real-time view of the battlefield, thereby enabling effective command and control. The Chinese military describes the new tactical information system component of the *Qu Dian* system as being analogous to the American JTIDS (Joint Tactical Information Distribution System). The satellites would reportedly provide the military with both 'C' and UHF band communications. Thus, once fully deployed, the FH series constellation would establish space-based military tactical communication networks to support Chinese military operations.

By 2015, following space developments are most likely: Operationalisation of China's *'Feng-Huo'* military communication constellation; Operationalisation of its indigenous *'Qu-Dian'* C4I system for its military requirements; Operationalisation of its "*Beidou*" navigation, targeting and positioning system; Operationalisation of its IMINT constellation of 4 Radar and 4 optical satellites which are expected to be in place by 2010; A Chinese lunar base experimenting in Helium extraction and refinement techniques to augment its fossil fuel resources and other energy requirements.

Sqn Ldr KK Nair
Indian Space Programme

The Indian space programme has a pronounced civilian bias and is not an offshoot of its ballistic missile programme. On the other hand, the latter is an offshoot of the former. The range of India's satellites include the INSAT and IRS series. India is well aware of the military use of space. In 1971 itself, the Indian military had requested for the use of space, but was refused. Since 1971, successive governments refused to provide the military any leverage to use space for its purposes. Till date, there is no agenda in India to militarize space.

In India, the military is not involved in the space programme. Unlike other countries, India's space programme pursues what it advocates. In that sense, its programme is unique. On the civilian side, however, the Indian space programme is doing a good job.

Questions, Answers & Discussion

- What is the US stand on legislation relating to the peaceful use of outer space? It has not done much on this subject.
- China's space programme capabilities have been increasing and should be contextualized with the influx of Russian scientists to China in the 1990s, after the collapse of the Soviet Union. The best of these scientists were offered to India in 1992 during Narashima Rao's period, but India did not have the strategic thinking to employ them, whereas the Chinese did.
- China's space programme is America-centric and the space war with the US has already started.
- China has deployed satellites over Iraq and is watching the war. Contribution of Russian scientists to the Chinese space programme is significant. During 1985-1989, most of the Chinese launches met with failure. In the 1990s, however, there have been no failures.
- In South Asia, China has included Bangladesh and Pakistan in its space programme, obviously with India in its mind.
- A difference needs to be made between militarization of space

and its weaponisation. The first has already taken place. The former is essentially bad, but cannot be helped now. As far as the latter is concerned, there are and would be no winners. However, India needs to worry about the second aspect – weaponisation of space.

- The US started the space race. China is following the US, but cannot hope to match the US and is likely to fail in this process. What India should rather worry about is China's missile proliferation, where they were proliferated to rogue states.
- In South Asia, there is a 1962 mindset amongst the analysts. China's response to the space programme is US-based and not South Asia specific. However, the Indian analysts see it as anti-Indian. On this issue, China does not have an option other than to respond to the US.
- China has been the most ardent supporter inside the UN to stop the weaponisation of space. And the Chinese efforts are genuine, as they would like to stop the US from pursuing the programme.
- How to control space debris? This is an important issue as the debris quantity is growing.
- There has been no mention of hypersonic aircrafts, which are capable of carrying and operating ASAT weapons.
- India needs an aerospace command. There is also an element of militarization that India must undertake in terms of force enhancement.

III
MISSILES AND MISSILE DEFENCE IN ASIA

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Chinese Missile Capability & Its Impact on South Asian Security Till 2020

Since the 1980s, India has been faced with a dilemma of deterring Pakistan and dissuading China. However, post-*Agni* III, dissuading China has graduated to deterring China. In this context, the Chinese BMD programme will be a trigger for speeding India's own militarization and weaponisation programme. The growing offensive orientation of the Chinese missile capabilities necessitates a strategic dialogue between India and China. The Chinese missile programme was underway even before the US introduced the National Missile Defence System. However, its decision to enhance its missile capability in face of the deployment of ballistic missile defence system (BMD) in East Asia has added a new dimension to the enunciation of Asian security.

The Second Artillery Corps

The Chinese nuclear and conventional missile forces are controlled by the Second Artillery Corps, which was renamed as Strategic Rocket Forces in the mid-1980s. The command and control structures are highly centralized and it operates within the strict control of the Central Military Commission. The tasks of the Second Artillery are to conduct nuclear retaliation campaigns and conventional missile attacks using both strategic nuclear missiles and conventional missiles to attack key enemy strategic targets. It also assists

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in the combat operations of the Army, Air Force and Navy.

There has been a doctrinal shift within the Second Artillery. There is speculation about the revision of the principle of 'No First Use of Nuclear Weapons' to include use of nuclear weapons in limited conflicts for discreet purposes. This denotes a possible enhancement in the role of China's conventional missilery. Interestingly, China's missile industry did well while its conventional defence-industrial complex was facing problems. In context of credible deterrence, a long-range missile programme would definitely be advantageous to China in countering the US and other states.

China's Strategic and Tactical Missiles

The Chinese strategic force modernization programme has been characterized by a change from liquid-fuelled and silo based missiles to mobile and solid propellant strategic and tactical missiles, increase in MIRV capabilities and enhancing of second strike capabilities. China is also involved in developing cruise missiles like the SY-1, HY series, FL series, YJ series, and C-701 and C-801. The increase in the annual defence budgets since the 1990s have emphasized power projection forces, and hence the missile programme. The DF-31 (CSS-X-9) — in development since the 198Os — was said to have enhanced China's striking capability vis-à-vis the US and Russia. It has developed Julang-1 SLBM for its Xia-class of SSBN, for second strike missions, and is pursuing development of sea-based version of the DF-31 missiles. It is estimated that China will possess 650 to 800 Dongfeng-11 SRBMs by 2005.It is only with the DF-41 that China can think to achieve credible deterrence capability against the US.

The DF-21 solid fuelled, mobile missile is aimed at deterring US aircraft carriers and other targets in the Pacific Ocean. The US National Missile Defence System was said to have adversely affected China's 'modest strategic retaliatory arsenal'. The extension of the Ballistic Missile Defence System umbrella to Taiwan in Asia has added to its concern. Responses to this development range from China trying to develop its own BMD system to restarting its fissile material programme if it has not already done so.

Impact of Chinese Missile Programme on South Asia

Predicting the implications of a burgeoning Chinese missile programme for South Asia by the year 2020 is difficult. It should be kept in mind that China does not recognize India as a nuclear weapons state. The Indian strategic weapons programme lags behind China, as the former is yet to deploy enhanced IRBMs and its short-range missiles do not possess deterrence value against the latter. However, while the immediate concern of China's strategic weapons programme are the US, Taiwan and Japan, its DF-3/DF-3A and DF-21 deployed in Qinghai and Yunnan provinces are major security concerns for India.

Whether China attacks India using conventional and nuclear weapons depends upon whether the bilateral relations deteriorate or embark upon some kind of alliance in the coming decade. China has continued to transfer missiles to Pakistan and may do so to other countries like Bangladesh and Myanmar in the future. A cause of dissonance maybe

the issue of outer space weaponisation programme. It is important that the two countries find a solution to missile proliferation and deterrence to ensure that it does not threaten their bilateral relations and South Asia stability.

Speaker: Arvind Kumar
National Institution of Avanced Studies, Bangalore

An Assessment of Pakistani Missile Capability

A self-contained nuclear warhead in the context of Pakistan is presumed to have a mass between 7,000 and 10,000 kg. In context of India and Pakistan, the missiles do not have a strategic role though they can be used as tactical missiles during war. The *Ghaznavi* missile — a modified version of the Chinese M-1 — poses a threat to Indian cities like Srinagar, Chandigarh, Ahmedabad and the borders of Delhi with its capacity to deliver a payload between 700 to 1,000 kg. There have been six launches of the *Shaheen* 1 missile, including a possible nuclear version. The *Abdali* missile has a range between 90 and 100 kms with a 500 kg payload.

The *Ghauri* —test-launched in 1998 — has been tested six times. The missile is North Korean in origin and can target Indian cities such as Srinagar, Chandigarh, Delhi, Jaipur, Ahmedabad, Mumbai, Pune, Nagpur, Bhopal and Lucknow. It is estimated that Pakistan may possess 30 such missiles. The *Shaheen* 2 is a two stage solid-fuelled rocket. It can target Indian cities as far as Hyderabad. This missile is still under development. If these missiles are deployed, India will have to bear significant damage even if it employs effective counter-measures.

The Pakistan Atomic Energy Commission (PAEC) is one of the earliest organizations involved with the missile programme. Apart from uranium enrichment for which A.Q. Khan was responsible, the PAEC was involved with all aspects of nuclear activities. The National Development Council under the PAEC is responsible for all missile and warhead activities. Since 2001, the missile activities have been separated. The National Engineering and Scientific Commission (NESCOM) are responsible for the programme now. The SUPARCO, which looks after solid rocket production facilities, is also under the PAEC. Kahuta Research Laboratories (KRL) is responsible for liquid rockets, including the *Ghauri* missile. However, as is well known the overall control lies with the Army.

Lt General Amitav Mukherjee
Indian Missile Capabilities till 2020

India's defeat in the 1962 Sino-Indian border war and the induction of China into the nuclear club in 1964 spurred the political leadershipin India to initiate development of an indigenous conventional and nuclear deterrent capability. India tried unsuccessfully to develop a long range ballistic missile and reverse engineer the Soviet SA-2 SAM in the 1970s. The period also witnessed the DRDO pursuing design and development of missiles, as well as the test firing of the *Rohini*-560 rocket in 1972 in lieu of the indigenous space programme begun in the 1960s. The Integrated Guided Missile Development Programme (IGMDP) in 1983 was an attempt to answer China's missile programme.

Integrated Guided Missiles Development Programme

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The progress made by the Indian space programme between the 1980s and early 2000s synergized the development of both short and long-range missiles. India also acquired submarine-launched missiles from Russia. The Integrated Guided Missiles Development Programme — launched in 1983 — aimed to develop the short range *Trishul*, the medium range *Akash*, *Nag* [third generation Anti-Tank Guided Missile (ATGM)], short-range *Prithvi* (SRBM) and the intermediate range *Agni*-I (SSM). It was expanded in the 1990s to include *Agni*-II, *Dhanush* (a naval version of *Prithvi*); the submarine launched cruise missile *Sagarika*, and the longer ranges inter-continental missiles *Surya* and *Astra*. India and Russia jointly developed the Brahmos supersonic cruise missile, which could be launched from a ship, submarine, an aircraft or land-based launchers. The SLBMs constitute an important component of India's No First Use Policy and enables a second strike capability..

Indian Missile Capability

The *Prithvi*-I, *Prithvi*-II and *Prithvi*-III have a range of 150 kms (1,000 kg payload), 250 kms (500-750 kg payload) and 350 kms (1,000 kg payload) respectively. In fact, it is speculated that the *Prithvi* III and the *Sagarika* are the same missiles. *Dhanush*, the naval variant of the *Prithvi* is capable of firing either SS-250 or SS-350 missiles. After the induction of the *Agni*-I/II Intermediate Range Missiles (IRBMs), *Prithvi* was considered to be a purely battlefield surface-to-surface missile using conventional warheads. The *Agni* family of ballistic missiles is considered to be the mainstay of India's strategic triad of nuclear deterrence. The *Agni*-TD is an amalgam of the *Prithvi* and the SLV-3 booster. The *Agni* II was India's first medium-range ballistic missile (MRBM). It has a claimed maximum range of 2,500-3,000 kms with a 1,000 kg payload and will act as a strategic deterrence against Pakistan, China or any other threatening extra-regional power.

The *Agni* I can carry a 1,000 kg conventional or nuclear payload at ranges up to 7,000-8,000 kms and was developed after the Kargil war to fill the perceived strategic gap between the *Prithvi* I/II and *Agni* II. India is reportedly developing an Inter Continental Ballistic Missile (ICBM), *Surya*. While the *Prithvi*, SRBM and *Agni*- I/II MRBM systems would continuously be improved, efforts would be made to establish an effective ballistic missile warning system. The Brahmos and Klub class missiles will be inducted into the navy. India would use high accuracy, rapid reaction terminal air/missiles defence weapons to counter the cruise missile threat.

Presently, India is vulnerable to surface-to-surface missiles and short-range ballistic missiles launched by both, Pakistan and China. In the name of missile defence capabilities, India possesses terminal low-level air defence weapons. India's endorsement of the US missile defence programme has led to it becoming a part of the four items in the Next Step towards Strategic Partnership (NSSP) between the two countries. The US offered to sell the Patriot missile, PAC-2 version in 2005 to India, while it opposed the sale of the Israeli made Arrow- 2 ATBM system to India.

Ted Postol
Status of the US Missile Defence Programme and Technical Challenges/Capabilities and

Limitations of Missile Defence Systems

Missile defence system being pursued by one country increases the insecurity of other countries and puts pressure on them to do something similar. Measures and counter-measures will influence the existence of stability in a particular region. Stability does not depend upon the ability to maintain the existing level of missile defence capabilities, but on whether the adversary can overcome the defence or not. All weapons systems have possible counter-measures. However, factors like economic power, political will and technology will ultimately influence the implementation and the extent of the counter-measures. Missile defence can be stabilizing if the defence system is so robust that even with counter-measures it cannot be overcome. It will be a destabilizing defence if it can be surmounted by the adversary. On the technical side, the debate is whether the system will work or not. It is obvious to think of benefits while contemplating missile defence, however, on the other extreme is the possibility that a country may still be hit much harder if the defence system does not work. It has to be remembered that whoever the adversary is, it has already learnt how to build ballistic missiles, nuclear weapons, re-entry and fusing devices. The question that arises is that why one should be interested in ballistic missile defence counter-measures?

Missile Defence Systems

The features of a missile defence should be discussed within a conceptual framework. Conceptually, air defence and missile defence system work in a similar fashion. Missile defence possesses surveillance radar with a demanding task of tracking the approaching target within a sufficient range and then guiding the interceptors to the incoming missile. In modern air and missile defence systems, electronically scanned radars are used over mechanically scanned radars for its multi-tasking capacity. The PAVE PAWS radar is used in the American National Missile Defence System

It is also important to know where exactly the missile defence functions. Air defence systems function i.e. they can only intercept aircrafts flowing at an altitude of less than 20 kilometres. This is where advanced missile defence like the Patriot comes in. Some more advanced missile defence systems like the Terminal, THAAD and the Israeli Arrow work at much higher altitude. The latter two can apparently identify objects up to a distance of 100-200 kilometres and 60-70 kilometres respectively. However, many of these capabilities have been found to be tall claims. The problem with air defence systems operating within the range of tens of kilometres is that they are not able to distinguish between a friendly and an unfriendly aircraft. This was evident in the shooting down of a Tornado aircraft in 2003.

Problems Facing Missile Defence Programme

A target can be thousands or hundreds of kilometres away. The purpose of counter-measures is to create a signal that will interfere with the capability of the radar to identify the incoming missile. Dodging the radar at long-range distances is easier as compared to short-range distances. High speed also becomes an added advantage at long-range distances. In the context of South Asia, ballistic missiles of modest

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range travelling at a speed of about 2,000 kilometres per second and long-range missiles travelling at a speed of 3,000-4,000 kilometres per second can interfere with the defence system and hence can prove to be an effective countermeasure.

Another problem facing missile defence systems is that the reflection received by the radar for a missile target is much smaller than that for an aircraft. The radar cross section for an F-16 will be 20 sq. meters, whereas for a US MX, it will be one thousandth of a square meter. Both, high speed and small radar cross-section can help in developing effective counter-measures. Another effective counter-measure is the use of decoys. The process of discrimination is used to identify the actual incoming object from amongst the decoys used. The adversary can also use electronic counter-measures. The US, for example, uses clouds of wires to hide warheads inside them as a counter-measure. Pieces of wire have small radar cross-section.

Even if poor decoys are used, it reduces the chances of interception. Considering the above facts about missile defence, it can be concluded that while deciding whether missile defence will have a stabilizing or destabilizing effect in the region, the underlying conceptual basis should be factored in. This in turn should be informed by policy issues as well as technical facts.

Observations

- The Brahmos is the only supersonic cruise missile in the world today. **The con is a subsonic missile given by Russia to China**. Brahmos does not have a terrain problem as it has a pre-programmed trajectory. It travels to a height of 15 kilometres and can be pre-programmed to avoid the terrain blocking its path.

- Strategic stability is a burning issue for South Asia. Pakistan has been ahead of India in this race. It had *Shaheen* I or the Chinese M9, which was an India-specific mated missile, four years before the Indians had any response to it. In 2004, the Pakistanis developed the *Shaheen* II, which was superior to Indian capabilities. India has to realize the fact that since 1983, Pakistan has been the Chinese defence against India. The first step that India has to take in this direction has to properly outline its staff requirements for *Prithvi*, *Agni* and the BRAHMOS missiles.

Questions and Answers

Question: What is the US doing about cruise missiles?

Answer: Cruise missiles are highly destabilizing. The early warning system deployed against cruise missiles in the US would be expensive and still will not be able to provide adequate warning against the incoming missiles. The speed and the small radar cross-section of missiles make it very difficult to detect and it is something that India should start to take this into account while developing its own defence system.

Question: Information available about the performance of the Patriot during the Gulf War I was that it was not able to hit incoming scud missiles. In the latest war in Iraq, as the information is classified, it is not known if the PAC-II and PAC-III have been able to overcome the difficulties faced back then. The US does not face the earlier problem of debris when scud missiles

use to break into pieces. Therefore, has the interregnum period shown any technological breakthroughs in the PAC-II?

Answer: In 1991, it was claimed that the Patriot had 96 per cent success with interception, but there was absolutely no data to support this claim. There have been reports that there have been numerous improvements that have been made to the PAC III, but, one will have to wait and see how far these improvements have gone in rectifying the earlier technical problems.

Concluding remarks

The most important rationale behind organizing this conference was to study the need to arrive at strategic and missile stability in the South Asian region.

As mentioned earlier, the main threat to India comes from Pakistan's *Shaheen* series, and any debate on stability has to take this factor into account and what India's response will be to counter this threat.

IV
MISSILE LAUNCH SURVEILLANCE IN SOUTH ASIA: CRITERIA FOR SYSTEM DESIGN

Geoffrey Forden

The aim of this presentation is not to define a system but to present the possible choices and implications :

A) Motivation for launch surveillance
   1. US-Soviet / Russian accidental near-nuclear wars
   2. US history of nuclear accidents
   3. Launch surveillance in South Asia

B) Outline of a shared Global Missile Surveillance System

C) System Definition : Design Tradeoffs

It is generally assumed that deterrence is a rational strategy; NATO, however, rethought this and brought new variables into the picture. If there was to be a deterrence relationship then both sides would need to be aware of the rational realties. The failure of deterrence is a specific aspect inherent to the strategy of deterrence, though this failure has a low probability. It could happen when one side views a benign event as an attack. There are at least four such examples in the history of the US-USSR relations and the Cuban Missile Crisis is not one of these. Machinery has been set in motion to tackle these perceived attacks, which were misinterpreted due to computer glitches.

An example of perceived attack was the 1995 Norwegian missile threat. On 25 January 1995, a sounding rocket launched from Norway triggered a Russian nuclear alert. The similarity in trajectory of US missiles and the sounding rocket heightened Russian fears of a nuclear attack. The Russians feared a sneak attack had already been launched by the US, but the missile was hidden behind the Earth's curve, and that warheads had been blown up in the upper atmosphere and this would block ICBM detection. The Russians took the launch so seriously that the then Russian President, Boris Yelstin, activated his nuclear 'football'. Russia's early warning satellite data, however, did not show other launches and since tensions were low in 1995, nuclear tragedy was averted. This incident highlighted the problems in

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Russia's early warning system. Russia had two different early warning satellite systems. The first consisted of geo stationery satellites and the other utilized satellites put in an elliptical orbit, positioned so that missiles placed against the background of space can be detected.

The Russian early warning system was one that was space-based. Monetary constraints had degraded it to such a degree that it could no longer reliably ascertain whether Russia was under attack. The functionality of a satellite can be assessed by its position. When a geo-stationary satellite loses its geo-stationary position it becomes redundant. Other satellites that are placed at an angle of 65 degrees stop functioning properly once the angle changes. Therefore, once satellites stop keeping to their stations they become redundant. By the mid-1990s, it became clear that few of the Russian satellites were functional. It is important to realize that such a system had prevented nuclear war rather than lead to one. Thus, it became important for the US to restore Russia's early warning system so as to prevent false threat perceptions. The then US President, Bill Clinton, proposed a joint system, which ran into many political hurdles. There is growing European interest in developing a global missile surveillance system that will help in the South Asian scenario. Such a system with the participation of India, Pakistan and China will lead to greater nuclear stability and will function as a CBM.

In South Asia, as opposed to a nuclear war, there is a prospect of nuclear accident with a single warhead. An example of such an accident elsewhere would be the BOMARC accident in the US. However, due to the one-point safety system wherein a single malfunction in any part prevents detonation, a major damage was averted.

The need in South Asia for such a system is great. Pakistan's weapons are derived from Chinese designs. There have not been enough tests to ensure one-point safety. Therefore, in the event of an accident, the first assumption in Pakistan would be that of an attack by India and it may retaliate with nuclear weapons. Even if some primitive one-point safety mechanism is in place, then though a large explosion may be averted and a smaller nuclear explosion could still take place.

In India and Pakistan, nuclear weapons are not mated. However, in periods of tension, Pakistan has assembled its weapons and readied them for delivery. Even the storage of demated weapons can be problematic if the handlers do not have enough experience. India would thus be safer if Pakistan could be assured that nuclear detonation were accidental in nature and not orchestrated by India.

A system for globally sharing data satellite would be so configured as to monitor all missile launches and this information would be shared amongst those who sign into the agreement. The question of the constellation and configuration of the satellite system arises. For any global surveillance system to be efficient, geo-stationary satellites would be required and the costs involved would be high. A minimum of two satellites is important because this will enable a certain degree of tracking and an assessment of the 3D trajectory path. A system for minimal global coverage requiring three geo-stationary satellites would cost upwards of $1.4 billion, while a system for full global

coverage, with five satellites would cost around $1.9 billion. Each country would have access to raw data from terminal stations. The time of flight between Indian and Pakistan is five minutes. If this time is reduced, then the system would be destabilized, the time delay is vital for the relay and authentication of date.

A surveillance system also works on the identification of missiles by analyzing the plume of the missile. To understand the brightness of missile plume as it goes from ground zero to the vacuum of space is interesting and complicated. Most missile plumes come from vibrational states of the combustion products. Thus, plumes are identified by looking at molecules radiating in infra-red and not in visible light. Two broad bands can be identified in the plume – that of water molecules which vibrate at 2-2.5 microns and carbon dioxide. These molecules are also present in the atmosphere; this makes detection of missile plumes difficult. For this reason, American satellites do not focus on ground launch because greater water evaporation takes place near the ground and the plumes could be misinterpreted. This was a major problem with Russian satellites that looked at ground launches. Due to this, 30-40 seconds after missile launch are missed, and the missile is identified only after it is at a distance of 10 kilometres from the ground. Identification at this height too is problematic because a considerable amount of plume is absorbed before the satellite is able to complete identification.

There are two technologies used for alerting and tracking missile launch. The first employs a single sensor which is derived from the push broom sensor developed in the 1970s. The other utilizes two sensors. Today the entire surface is surveyed all the time; however, a trade-off is made on resolution. Surveillance with better resolution would miss some sections somewhere. Thus, while designing a surveillance system, trade-offs have to be made over issues of cost vs. coverage, wavelengths of light used to see the ground vs. reduction in false signals, and in the number of sensors per satellite determining resolution and revisit rates.

Subrata Goshroy

Promoting missile surveillance systems is a very expensive proposition as it would cost a-billion-and-a-half dollars for a basic system and $2 billion for a comprehensive system. The aim of this presentation, however, has been to encourage the thinking that Europe is interested in a global missile surveillance system

Question & Answer

Question: Would it not be easier and less expensive to disguise missile plumes rather than employing such an expensive system to detect missile launches? Is it possible to launch a missile into the atmosphere without igniting it?

Answer: The plume in infrared is bigger than the missile as a whole and therefore is impossible to shield. The system could be fooled by using a fluoride oxidizer instead of an oxygen oxidizer. However, this would require further R&D. The incentives for such research do not exist at the moment. The problem with hydrogen fluoride is that it is very unstable because it produces hydro fluoride which is extremely toxic.

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As far as 'cold launch' is concerned, the missile would take longer to be carried higher into the atmosphere so it would be easier to detect and will not fool the system.

Question: Since the time available between detection and response is only five minutes, if we keep two minutes for detection and three minutes for response, then this system does not provide a good cost-benefit ratio in favour of an expensive system.

Answer: This system is not designed for warning of an actual attack. It aims at giving warning of accidental detonation. Command and control of a state's missile system will not be put into gear to this system. This proposed system will address only situations where there is no real attack but accidents.

Question: While the proposed system is indeed a laudable effort, has it been discussed in any international forum? Have the issues of ownership of satellites and infrastructure been addressed?

Answer: Though the system has not been discussed at an international forum, it was discussed at a recent Carnegie Endowment conference where it was concluded that such a system would be beneficial for South Asia. The system would be so designed as to eliminate operation choices of where to survey. Surveying would be global. A separate organization would have to be set up to ensure proper operation. These are ideas that continue to develop.

Question: Would such a system be headed by the US?

Answer: The US considers its early warning satellite technology to be essential for its existence. Thus, prohibitions are enforced on scientists who may work on this system because of fear of technology transfers and replication. Therefore, it would be best if the system came out of a global effort. American leadership for such a system may well take away some of the credibility as well, considering the current mood towards US foreign policy.

Question: Are the costs involved justifiable?

Answer: Any such system has a minimum requirement of three geo-stationary satellites. The US consistently maintains six to take care of redundancy. The system would be equipped with infrared sensors, optical telescope and nuclear explosion sensors with optical flash detectors on global positioning satellites. The potential costs could therefore vary depending upon various factors. The French are attempting to set up an early warning system with two satellites for $120 million, perhaps with reduced capabilities. This only attests to European interest in such projects. The utility of this discussion was not to ask for Indian support but to encourage the indication of interest and promote the rationale of stability that such a system would provide. An indication of support would encourage the Europeans to develop such a system. Spending $2 billion for a five satellite system is a reasonable sum. However, 3D surveillance is possible even with just one satellite, provided it has the proper optical telescopes.

Concluding remarks

It is not possible to assess whether combined thinking and efforts on such a project will materialize in the near future. With the Indo-US nuclear deal,

India has gained four advantages – nuclear waste management, one-point safety (with the first American going to BARC), the ability to maintain nuclear forces at sea, and an anti-missile defence dependent on the Greenpine radar. It is, thus, unclear whether we are headed in the right direction as far as stability is concerned. This system along with options such as additional CBMs, better deployment options and the assurance of minimal risk of accidents could go a long way in maintaining missile stability in South Asia.

V
IMPROVING GLOBAL STABILITY THROUGH MULTILATERAL AGREEMENT

Sir John Thomson

This presentation will focus primarily on the political field. The political discussions held in Washington, London and Moscow during the Cold War was reassuring. There was a high degree of professionalism, asking the right questions and not being too sure about what the answers were. But, the Asian problem is much more complicated than what it was between the two super powers. The comparatively simple Cold War ended without warning and left approximately 80,000 warheads between the two superpowers. This remarkable result was not the result of political-military action, not the result of technology, but the result of political action.

Three points that were made earlier must be reemphasized. They are: It was easy to get into an arms race but difficult to get out due to the huge influence of vested interests and therefore, it is crucial to maintain political control. The phrase minimum credible deterrent is very widely used. In fact, every country that has a nuclear force, describes its objective as the maintenance of minimum credible deterrent. Apparently, for the US and USSR, this means several thousand warheads and an equal numbers of missiles. While for the British, it means four submarines with 16 missiles each; with a variable number of warheads on each missile and only one submarine on patrol at any given point in time. Therefore, credible minimum deterrence can mean very different things for different countries. What does it mean for southern Asia? Apart from India, Pakistan and China, other countries like Russia, Japan and North and South Korea and Iran must also be considered to draw up a larger picture in the future.

The timeline is very important since 2020 is the deadline. It must also be kept in mind that by 2040, India will have the largest population in the world. In this context, deterrence is a mixture of stability and deliberate uncertainty. It is important to remember that it has to work through out the year, and for a quarter of a century and beyond that. In this sort of timeline, the constellation of relationships between states cannot be predicted nor can the internal stability of various states be predicted. The West is already concerned about Pakistan, Iran and to a lesser extent China also.

It is a game of three dimensional chess and it will evolve into six dimensional chess in the near future. Therefore, it is difficult to account for all three or six bits simultaneously. In this scenario, lack of transparency will lead to guessing of intentions and capabilities, and it might be a faulty reading. This

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is basic point that applies to all and not only to Pakistan.

India has a lot of fissile material. After the Indo-US nuclear deal, India has kept the door open indefinitely to produce more fissile material. Thus, other countries will conclude that India is aiming at a "big" programme, but not to the scale that the US and Russia did during the Cold War. Yet, in plain terms, there exists the possibility of a substantiative arsenal. Also, official Indian policy about this issue is very cautious. But, looking at some of the commentary — which is almost official and slightly less cautious — most countries would have to assume that India is aiming for a complex nuclear force, probably in air, and on land and at sea. And India might even get some sophisticated foreign help, perhaps from the US and others; the Russians have helped, different countries have also helped at crucial times.

That Beijing and Islamabad will look at this development as a worst case scenario is a fair assessment. These countries will undoubtedly make some assumptions and it will vary as they look ahead. Russia, Japan, the Koreas, and perhaps Iran and others, and in due course of time, the US and Europe will all be making their assumptions. There will be assumptions about the Indian programme in 10 or 20 years. Pakistan will have to make assumptions. But, the situation is more complicated as China will also be calculating its stance vis-à-vis all of these countries. Pakistan will have a much simpler set of calculations, but it will do everything it can to keep up. How Pakistan defines 'keeping up' is the question. Pakistan will not define it as parity in numbers, but will define it as being more sophisticated or ahead in certain areas. Pakistan will certainly want more sophisticated weapons. This seems to be a political position; and does not guarantee instability but it does offers opportunities for instability.

This topic of the conference is both interesting and also a very difficult one. Broadly speaking, there are two ways of producing stability anywhere, not just southern Asia.

First, produce a perfect balance and form alliances; everybody always makes a calculation, but always remains stable. This is an assumption and seems unlikely, but it is theoretically possible. On the other hand, this system has to function throughout the year. Any lapse or many lapses will result in a disaster. The second way incorporates the first option (i.e. military balance) along with political balance. This entails transparency and understanding. The most important confidence building measure that occurred in the Cold War, which occurred accidentally, was that the US and Soviet experts began to speak the same language and understand the other's position, and in the process began to understand the facts. It is hard to debate the other's intentions, but without having inkling about the other's intentions, proper judgments elude decision-makers.

Political stability needs greater emphasis and that requires further discussion as it is the most crucial element. The need is to consider specific proposals. But, it must be reaffirmed that in everybody's interests, ensuring political stability is greater than missile stability.

Geoffrey Forden's presentation about Global Surveillance System is a worthy consideration and will help in

arriving at political and strategic stability.

Maj. Gen. Banerjee
Sir Thomson's remarks sums up all the key points discussed during this conference. Based on his remarks, we could come up with some specific recommendations and look for ideas and suggestions to look for arrive at stability in southern Asia.

R K Mishra
One basic doubt that needs to be answered is: If a country declares a no first use of nuclear weapons policy, how relevant is this policy? Will it still possess a second strike capability when it is targeted with megatons nuclear weapons? Clearly, that second strike capability will not be available. The first will be the last strike. That can be discussed. One of the comments made was that nuclear deterrence should not be included in war planning. This argument is fallacious. Nuclear weapons must not only be considered in war planning, but it should also be deployed. This will definitely create deterrence. But, an occasion for nuclear weapons use must never arise. Furthermore, if country A uses nuclear weapons against country B, what is the outcome? It will depend on various factors, like wind velocity. The country using the weapons might also face problems of nuclear fallout and other problems.

Missiles should be tested to confirm reliability. This is possible for short-range missiles, like the *Trishul*. But the *Agni* type missiles cannot be tested as it is exorbitantly expensive. Today, the reliability is tested by conducting simulation exercises. The aspect of 'lies in technology', such as exaggerated capacity creates an arms race against weapons that do not exist.

Deepak
Cost analysis is the most important factor. We must keep in mind that the downfall of the USSR was partly due to the arms race during the Cold War. The cost fallouts for BMD in India will have repercussions for growth in India. Therefore, India must consider the long-term repercussions on nation-building.

Major General Ashok Mehta
It is important to make note that Track 2 discussions are far ahead of Track 1 discussions. Track 2 discussions have fed into Track 1 discussions. For any meaningful promotion of stability, dialogue between India and Pakistan is necessary. There are no Track 2 discussions as far as China is concerned. For more meaningful dialogue, China has to be included in this triangular matrix. One of the critical factors for Track 1 discussions is that both sides see nuclear capabilities as a factor of stability. At one time, South Asia was considered a nuclear flashpoint. During the December 2001-October 2002 stand-off, there were eight nuclear threats, five missiles test-fired by Pakistan and India test-fired three missiles. All this was during a period of high military confrontation.

Pakistan claims that it is no longer Indo-centric and there is no quest for parity. This is a false assertion. The Indo-US nuclear deal might destabilize the situation. After the *Babur* missile was test-fired, Pakistan Prime Minister, Shaukat Aziz, stated that Pakistan had achieved much more than minimum credible deterrence. More substantive agreements elude

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both sides. While India has tabled white papers about nuclear risk reductions measures, Pakistan has produced a strategic regime paper. Pakistan insists on the discussion of the core issue —Kashmir —before discussing other substantiave issues.

India's Prime Minister, Manmohan Singh, made specific offers after flagging off the Amritsar-Nankana Sahib bus service. This must be seen as an effort towards political and military stability. During Track 2 discussions, specific measures need to be taken. India and Pakistan should not deploy short-range missiles, which are also known as destabilizing missiles. There should be agreements to this effect. When Pakistan expressed doubts about the BMD, India stated that it was ages away from any such BMDs. There are questions that need to be addressed depending on how the Indo-US nuclear deal shapes up, and how the US assuages Pakistan's concerns about its position.

Maj. Gen. Banerjee
The question is to explore ways to build on Track 2 discussions. There are no Track 2 discussions with China as there is only one level of dialogue with China and that is the official level. Though a number of think tanks visit China and I was fortunate to lead one such only last November, no discussion on nuclear weapons confidence measures issues take place.

Maj Gen Ashok Mehta
India cut off all Track 2 discussions during, and in the aftermath of the December 2001 confrontation with Pakistan. However, Pakistan was willing to continue Track 2 discussions at that time. Indian instructions have since changed. Now, Pakistan has clamped down on Track 2 discussions. NGOs are not given permission to travel abroad or attend discussions.

Rajesh Rajagopalan
With regard to political and military stability, one must also address whether the political and military decisions can be separated so that they do not impinge on one another. While India and China can achieved this objective, Pakistan's abilities remain a grey area. Secondly, why do political decision-makers invariably display a higher degree of hesitation when it comes to the crunch? What is their operational outlook? If there is a crisis, what is the tipping point? Thirdly, the central problem in South Asia concerns basic concepts and discourse vocabulary. The region has adopted an assured destruction discourse from US writing (the three concepts of credibility, vulnerability and survivability) without questioning it. The seeds of an arms race are embedded in the discourse. The starting point of this discussion is deciding what the acceptable risk is? One city-one bomb principle might work.

Ted Postol
The military and technical aspects are helpful in maintaining security and stability as it provides two substantial inputs. The two characteristics in the armed forces is that they contribute to the confidence of political decision-makers, and if the political decisions-makers feel more confident, they are less likely to move from the political to military mode. That is the importance of building forces. These forces need not be large, but they have to survive. Mobile missiles theory says that they will survive, but in reality it is a misleading theory. Nevertheless, the thinking needs to be centred around nuclear weapons in terms of people and the death and destruction it is

capable of inflicting on humanity. High priority has to be placed on moving a fraction of nuclear weapons to submarines. To this end, diesel electric submarines are enough. Nuclear submarines are unnecessary as they are difficult to build and there are technical demonstrations by several states that diesel electric submarines work equally well. Instead of waiting for 10 or 20 or 30 years, diesel electric submarines must be deployed now. This would greatly reduce the pressure on warheads. The leadership decision crisis needs further deliberation. The whole system of command and control is not necessary. When instant communication is not needed, it reduces the chances of a false message and thus, greatly reduces risk.

Lieut Gen Amitav Mukherjee

Strategic stability is the greatest challenge, and without political stability it does not exist. India and Pakistan have made concerted efforts and held many levels of dialogue, but security concerns are not addressed. They are reluctant when it comes to discussing the issue of proxy war or the 'core issue'. Normalization of such issues is approached reluctantly. Regular political and cultural contacts improve the atmosphere but do not reduce the source of discomfort. The ongoing Sino-Pakistani security collaboration is a source of political instability. Notwithstanding that, the situation today has improved greatly. Smaller forces with assurances of a second strike capability is a feasible option.

There are limits on missile delivery systems on the western theatre. Pakistan should be sensitive to our needs against China. The GMSS has been endorsed, but before India accepts it, there has to be a broad-based global acceptance. Like the North and South Korean situation, there must be a broad acceptance or interest that will make it easier for India to be willing to share.

About the issue of missile defence systems – can something be done? Pakistan thinks these systems are unstable. Along with more circumspection, greater transparency between India and Pakistan for deployment of ATBMs and the limited deployment of BMD systems is needed. While considering strategic stability, China must not be forgotten. In Track 1 discussions, India is reluctant to take up the issues of the larger South Asian situation. India should engage China to create a politically stable situation.

Maj. Gen. Banerjee

Since 1993, there has been an engagement between strategic think tanks in India and Chinese think tanks, but strategic issues have not been discussed. There is no dialogue as China does not want to discuss these issues. This is because China does not recognize India as a nuclear power. The official level dialogue has only just begun. Only three rounds have been completed so far.

Bharat Karnad

China is willing and it is pushing for the US-India-China strategic matters to be discussed seriously. As for the suggestions by Ted Postol, deployment of missiles on submarines is being considered by the Indian Navy. Strategic stability is a politically sensitive issue that is premised on two nearly equal states. However, there is no parity in the subcontinent. India's

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problem is preoccupation with Pakistan. India must disregard Pakistan and address its own security concerns by unilaterally removing the short-range ballistic missiles from the western border as it has a contingency of long-range missiles. Politically, the symbolic significance of this gesture will be immense. Whatever India does with Pakistan, it must be done unilaterally.

In answer to what RK Mishra said earlier, it is not discourse but doctrines. Terrorism is not connected with nuclear weapons as nuclear weapons only deter other nuclear weapons. It has nothing to do with counter-insurgency. Pakistan is far more vulnerable to these kinds of activities. There are auto-combustion possibilities with grave consequences.

K. K. Nair
The GMSS will cost $2 billion as compared to the $200 billion commercial money spent in 2003 for various space programmes. Cost wise, this is a workable proposition. Non-state actors have not been considered into the calculus.

P. R. Chari
What are the complexities of the nuclear relationships between India, Pakistan and China? When one of these countries proceeds with deployment of greater and greater range – what are the implications for the others? Doctrines are very important. The Lahore Declaration said there would be a dialogue on doctrine, and emphasised on Track 1 and Track 2, but this has not happened. Far from there being any doctrine, there are dangerous doctrines – Pakistan is talking about "strategic depth" when Afghanistan is in a post-Cold War conundrum. India is talking about "limited war," and "cold start attacks" ignoring the possibility of escalation. Greater thought needs to be put into these issues.

Sir John Thomson
No-first use takes care of public opinion even if nuclear capability is not included in war planning. It should be so integrated that your next step but one is nuclear. Strategic stability is the reason for the fall of the USSR, and not because of an arms race.

In Pakistan, there was an optimistic feeling about the current India-Pakistan dialogue. Increase in dialogue opportunities with China is another positive factor. It is important to have these discussions. Politicians show more restraint because they do not feel responsible for military technical staff. They depend on the chiefs of staffs. Nothing in politics is like nuclear weapons – as one can always change their opinion. It must be stressed that acceptable risk is an important question.

Maj. Gen. Banerjee
Ending on an optimistic note, it must be reiterated that as far as stability is concerned, there is potential for change in the global agenda. South Asia too is changing. This year has been declared as the India-China Friendship Year, for all that this might connotate. As for Pakistan, the Indian Prime Minister's recent call at Amritsar for for focussing on governance and cooperation in both countries and his second round table conference with Kashmiri leaders in end May this year show real possibilities if accepted by Pakistan. Perhaps Pakistan should show some pragmatism and flexibility on these issues and particularly on strategic stability.