# Technology in the Military: The Triple-Trap, Dual-Use and Single Reform

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Notwithstanding the stoking of enduring controversy and discord that seems endemic to military procurement in India – as, indeed, in other significant military powers as well—the centrality of technology in establishing and maintaining military capability and preparedness is obvious. As our military moves inevitably from being a man-intensive force to a machine-intensive one, we need to recognise in our planning and acquisition processes that what has to be organised is the ability to prevail militarily all along the locus of force engagement with the adversary – the weapon, the equipment, the man-machine symbiosis are the means through which the strategic and tactical use of military dominance is exercised. The acquisition of these means, by import or domestic technological development and manufacture, is not an end in itself.

Thus, the required 5D (Deterrence, Dissuasion, Denial, Disruption, and Destruction) capabilities of the armed Services for deployment in changing theatres of conflict will call for appropriate provisioning of the Services with 5D "effects-based" technologies. But doing so by import, will present insurmountable difficulties, for:

*What is developed abroad, will not suit our new requirements in the changing theatres; what is suitable, will be denied; what is not denied, will be unaffordable.*

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This is the already recognisable *triple-trap* that the Services are facing. This paper outlines the way out of this triple-trap; delineating the necessary single reform relating to the locus and content of the performance of Research and Development (R&D) for enabling the provision to the armed forces of the technological component of 5D capabilities – capabilities which will need to be effective, affordable and agile enough to meet the needs of future military conflicts whose time, circumstance and intensity will be as unpredictable as their likely outcomes.

## The Geo-Strategic Context

Notwithstanding the almost masochistic pleasure we take in self-goals, we seem to score so well in foreign policy as much as in the hugely delayed modernisation of our armed forces, that a "repositioning of India in regional and world affairs" – post our nuclear tests of May 1998, and even more post the oil wars in West Asia and human-intensive violence in Af-Pak – is now a geo-strategic imperative, not just a ruling establishment yearning. Such repositioning requires an active strategy. That strategy has to jettison India's historical posture of mere reactive preservation of 'maximum available autonomy at lowest possible cost'; for, the world will not leave us alone even if we wish to be left alone. Even our neighbourhood is peppered with those with mendacious intent, or shaky rulers who whoop in vicarious satisfaction at immobilising a flailing Gulliver – even if only temporarily.

Without such an active strategy, our new generation will inevitably be saddled with stultifying, anxiety-ridden *status quo* paralysis and global diminution in the face of the inexorable rise of China to Number One global power in less than 20 years. This inevitability is still not widely appreciated in a significant segment of our elite.

## Technology in India's Security Policy

Indian Prime Minister Manmohan Singh said in a speech delivered at

the Institute for Defence Studies and Analyses (IDSA) on November 11, 2005:

> … I have said in the past that our security policy in the emerging global order must be based on three pillars. The first must be to strengthen India economically and technologically; the second, to develop adequate defence capability, making the optimal use of modern science and technology so that we can effectively meet all contemporary challenges to our security. And, finally, we must develop partnerships in the strategic, economic and technological spheres to enlarge our policy choices and developmental options.

It is of significance that 'technology' is explicitly identified as an integral component of all three pillars of security policy as, thus, enunciated by the Prime Minister. Our military must be provided not only the technology-embodying equipment to apply force at the time and place of its choosing, but also the agile means to tailor the 'effects' of its choosing with the means at its command. Such provisioning is possible only if our military moves rapidly from being a man-intensive force to a machine-intensive one.

The centrality of technology to establishing and maintaining such military capability and preparedness is obvious. But many planning components of our military seem not to have fully recognised that what has to be organised for is the ability to prevail militarily all along the locus of engagement with the adversary – the weapon, equipment, man-machine symbiosis, or engagement techniques are means by which military dominance is exercised. The acquisition of these means is not an end-goal in itself; and that, the locus of military engagement will, in turn, 'reconfigure' with changes in military doctrine – as in Special Forces operations; and may well be nearly virtual – as in psychological operations; or be actually so – as in cyber-warfare.

## Technology in the Weapons Systems Acquisition Process

There is a very large body of literature on the role of technology[1] in the systematics of the development of weapon systems and related equipment procurement 'reform' in different countries. The more candid examples of the literature reveal the modest results achieved in relation to the expectations of the proponents of various reform schemes. Even official reports and evaluations display barely suppressed frustration.[2] Several working groups and committees in this country have also been over the same ground, most notably the Arun Singh Committee.[3]

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It is well-recognised that military research, development, test and evaluation are integral components, at least conceptually, of the military procurement process. What is less well understood is that processes of embodying 'technology' are themselves conditioned by sociology, and legacies of process(es) influencing groups, most notably the Directorates of Staff Requirements in Services Headquarters (HQ), senior civilian officers in the Ministry of Defence (MoD), and, of course, the Department of Defence Research and Development [often wrongly conflated with its major component, the Defence Research and Development Organisation (DRDO)]. I, for one, have lost count, over the past three decades, of the pronouncements, op-eds, letters to the Editor, diatribes mostly against DRDO by retired military officers in weekly magazines, as also articles in military journals (including this one) pleading for, and proposing, varieties of reforms in our military procurement procedures and processes.

In the context of the above as prologue, it would be futile, and another wasted exercise, to expatiate on comprehensive 'procurement

reform' as a prerequisite to address our R&D effort in that process. Such an exercise is, therefore, not attempted here.[4]

## The Locus of Performance of R&D for Military Needs

Even a Sainik School leaver recognises the qualitative difference between carrying out life-science based research into new varieties of seeds for the fresh vegetables grown for, and procured seasonally by, the Army Supply Corps; and the engineering development of a main battle tank for bulk production by an Ordnance Factory (OF) for regular delivery to the Army over a period of two decades or more for use by the armoured corps. Yet, as a historical legacy, the 'R&D' necessary for both of the above is executed by the same organisation – DRDO, under one agency-head – its Director-General.

As noted in an earlier contribution,

> …the inertial continuation of these accumulations of history ... will have several debilitating effects: one of these is that DRDO and its leadership will be judged by their Service or production-agency customers of technology equally by DRDO's ability, or lack thereof, to supply recipes for tasty military rations, or technology for battle tanks and a Light Combat Aircraft (LCA) that the user Services expect to be 'state-of-art' a decade into bulk delivery to them from production agencies that are administratively and managerially separated from DRDO, with in-built technological self-upgradation capabilities for the duration of the equipment's service life thereafter.
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> ... A second effect ... that is possibly more pernicious is the impact on the national S&T system (not only DRDO) to meet military requirements. This is the *de-facto* mislabelling of projects of being of "high" or "low" technology. Certain projects and programmes of "high technology" (e.g. missiles, electronic warfare) receive top management attention, including of the Services, and are in the media and 'Padma' Awards' eye. Consequently, apparently mundane but far-from-trivial

technical requirements of the Services, e.g. for low-intensity conflict are left under-tended, though not under-funded.

Consequently, when the technology developed by DRDO or others for these real here-and-now 'low-technology' Service needs, has fallen short of acceptable field performance, a frustrated user Service makes-do with a less-than-satisfactory domestic product and waits, half in ironic hope, for crisis time, e.g. Kargil, to induce impulsive and expensive imports, some of which have (anecdotally from serving officers) also not adequately met requirements when first used in our theatres of combat (again, Kargil). Equally, and per contra, a real-life story rarely told is the number of times DRDO has, at short notice, overcome technological and other shortcomings in, or replaced urgently needed denied spares for, weapons, equipment and stores imported in full, or manufactured domestically with imported technology.[5]

## The Looming Triple-Trap and the Capacity Constraint

As further noted in the same reference,

> Quite apart from expense, such impulsive imports made on the experience of deficiencies in the just-experienced operations may not be met by the properly-judged requirements of the next expected or planned-for conflict, potentially creating inter- and intra-Services imbalances which impact, *inter alia*, on readiness for, and effectiveness in, other theatres of contemporary conflict, or in the same theatre at other times.

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It is not adequately recognised that the dimensions of the scientific,

technological and manufacturing effort that are needed to break-out of this 'triple-trap' are so large that the entire Science and Technology (S&T) and advanced manufacturing infrastructure of the country is barely up to the task.

To get a feel for the numbers involved, assume that the Services are satisfied with every piece of equipment or ordnance that DRDO is committed to develop; assume also the technology transfer from R&D to production – whether to the Ordnance Factories (OFs), Defence Public Sectors Undertakings (DPSUs) or the private sector—is smooth and fault-free. Assume further that the Services are provided with all the monies they require for placing orders for the equipment or ordnance, and that all such orders are placed.

In the past decade, even the notional debit of the monies for all of the above acquisitions has not exceeded 20 percent (by total value of production) of the monies—both capital and revenue—made available to the Services for their acquisitions, excluding those for the Strategic Forces Command. This proportion (of 20 percent) is unlikely to change much through to 2020 (perhaps for much after).[6]

It is a mistaken notion to suppose or believe that the DRDO, OFs and DPSUs have enough capacity among them—even if performing at their peak by the dedicated exertions of some of the best human capital this country has—to cater to the full technological spread of our future military needs.

## Mandating Dual-Use: The Only Way Out

This capacity constraint cannot be overcome without extensive use of domestic civilian manufacturing capacity and capability, supplemented by the enhancement of that capacity by foreign investment for the purpose of domestic manufacture for the large-scale production of *even the products of domestic military R&D (whether performed by DRDO or any other organisation)*. That, almost counter-intuitive point recognised,

given the human resource shortages in critical skills, the Indian civilian industry will jeopardise its commercial cost-competitiveness even in domestic markets – not to say foreign ones—if offered only mil-spec dominated systems for production in mil-only dedicated production lines, even if the required capital investment is subsidised by the government.

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Therefore, short of development of wholly new science-based enabling-technology, and equipment or systems based on them, "dual-use" will need to be institutionalised by mandated use of Commercial-Off-the-Shelf (COTS) to fulfil existing or new military requirements, particularly of non-ordnance stores. Notwithstanding extensive use of COTS, military systems will inevitably have to gain access for their production to the "dual-use" manufacturing technology imported under end-use conditions by the Indian civilian industry 'globalising' with large foreign investments.

There is, however, one essential – indeed seminal – safeguard in respect of inviting and harnessing foreign manufacturing investment for military end-uses. To wit, the set-up and use of such foreign-owned production facilities for domestic military requirements will call for countervailing legislation to prevent the extra-territorial application of foreign laws and regulations to in-country supply of goods and technology.[7] Such legislation exists even in the North Atlantic Treaty Organisation (NATO) countries such as the US, UK, Canada and Germany. The fashioning of such legislation is a complex – even arcane – subject, beyond the scope of this contribution, although very pertinent to its purpose.

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## The Single Reform

The foregoing paragraphs have sought to establish that the core of the problematique is mainly structural, and partly functional. Therefore, to proceed further along the road of what should now be done, there are four principles of organisation and structure that need to be applied:

- If the effort is to provide a technology-based support service (e.g. for fleet support; food and rations), its performance should be located organisationally as close as possible to the user of the support service – preferably within the user's organisation, and managed by it.
- If the purpose of the effort is to assemble mature technologies into a product-design or prototype of a product, the national R&D system, including DRDO, should engage in it only on contract to the production establishment (whether an OF, a DPSU or other), paid for by that establishment.
- Certain military production facilities (including in the private sector) with long-standing close relationships with a particular R&D laboratory or facility could take over the latter's management, e.g. as a Government-Owned, Contractor-Operated (GOCO) facility.
- The excellent facilities, very good scientific personnel – indeed extraordinary in some areas – and research infrastructure (albeit both now ageing) of *DRDO will need to be concentrated on doing only that which the rest of the Indian S&T system, including in the private sector, cannot do;* for example, highly classified electronic warfare; ballistic missiles, and proof-of-new-concept demonstrations.

## Application of the above Principles to Procurements for the Army: Illustrative Examples

Any realist will concede that reform of the above type is unlikely to the initiated and executed under the grand sweep of an all-encompassing political directive. Indeed, for the Army, there would be merit in seeking to make a beginning with those establishments and laboratories of DRDO that have had, for long, a close relationship with the user-formations of the Army that they serve. For illustration, these might be the DRDO laboratories at Leh and Tezpur, which are facilities that have had serving officers from the primary user-units of the Army as their Directors. R&D Engineers in Pune, deliberately located there to be proximate to the headquarters of the Army's Corps of Engineers, is very largely a systems integration and Test and Evaluation (T&E) facility which uses very extensively the manufacturing capacities and capabilities of the private-sector in the Pune-Mumbai belt. Likewise, the Vehicles Research and Development Establishment (VRDE) in Ahmednagar which is devoted to the configuring and T&E of non-tracked vehicles.

All that needs to be done to initiate the shift as advocated above is to debit to a new, separate, Army R&D budget-line, the staff-project expenditures of these establishments. These expenditures could be sanctioned, and the incurred expenditures monitored, by – say – the Vice Chief of the Army Staff (VCOAS), assisted by the Special Assistant (SA), to the Chief of the Army Staff (COAS), an already extant post and person. However, an important implication of such a shift is that any audit queries on these expenditures will require to be answered by the Army, not by DRDO, *even if the contract for the R&D is executed by DRDO.*

## Notes

1. For an earlier extended elaboration, see V Siddhartha, "Technology in the Future Needs of the Armed Services," Chapter 11 of *India's National Security Annual Review (INSAR)* (New Delhi: Vikas Publishing House, 2002).

2. For a particularly revealing example, see Bernard Gray, "Review of Acquisition for the UK Secretary of State for Defence," HMSO, United Kingdom, October 2009. This report is particularly apposite because a great part of India's acquisition procedures and processes derive (still) from UK practice.
3. As of March 2013, there is yet another group—apparently an informal one—headed by the current Chairman of the National Security Advisory Board.
4. By March 2013, the Raksha Mantri announced that yet another change/update to the Defence Procurement Procedure (DPP) is in the offing.
5. Whether a part, component or sub-system that goes into the manufacture of the complete system is a "technology" for the latter is a red herring of little analytical value. An IC engine is just that. Terming it 'motive power technology' does not change it in any way.
6. For more details, see Table 1.1 of "Emerging Opportunities in Indian Defence Production," Confederation of Indian Industries, 2013; additionally, it is also based on conversations in 2012 of the author with senior officers of the DRDO.
7. It is this aspect, and not the widely-held and regurgitated belief that majority foreign-ownership of military production facilities is the primary issue. Nor even the safeguards (which in any case exist in Indian legislation) of hold-back by such entities of their foreign-owned intellectual property, whether or not embodied in the military products themselves.