

Centre of Gravity and the Targeting Conundrum

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The Indian Air Force (IAF) operates in a congested and contested geopolitical arena. Herein a common understanding of the Centre of Gravity (CoG) can ensure military focus. Understanding of CoG may be approached with differing perspectives. This article would attempt to harmonise these perspectives. Post target identification, planners would be confounded with the dilemma of targeting while applying concentrated firepower. Should this concentration be limited to time and space or in purpose too? Possony studied the air campaigns of World War II and presented one such model for prosecution. His study has been reviewed for application in a contemporary scenario to create conflicting, concurrent and competing demands on an adversary through selective and concentrated targeting.

Keywords: *Centre of Gravity (CoG), Targeting, Concentration, Indian Air Force, Operational Planning*

Air power is indivisible. If you split it up into compartments, you merely pull it to pieces and destroy its greatest asset—its flexibility.

— Field Marshall Bernard Montgomery, British Army
The Journal of the Royal United Service Institution,
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INTRODUCTION

The Indian Air Force (IAF) today faces challenges that are unique to the congested and contested geopolitical space of South Asia. Two antagonistic nuclear-powered neighbours with near parity in military prowess, hot borders and a multitude of flash points is a situation that perhaps no other nation contends with. With this comes the dilemma of prioritisation. Over the last few decades, the IAF's operational exposure has been limited to small-scale and localised contests. Such scenarios have not tested target prioritisation and selection to the extent a large-scale conflict would. The relative geostrategic peace since the Indo-Pakistan war of 1971, though beneficial to the socio-economic development of the state, has perhaps left a gap in the understanding of large-scale conventional military contests. A focused air targeting campaign would be truly tested in such an eventuality. Two factors that can aid effectiveness are a clear understanding of the Centre of Gravity (CoG) and the consequent concentration of force to target it. However, considering the divergence of views and perspectives in the understanding of the concept of CoG, practitioners face a unique problem of interpretation. That said, given the complexity of any adversarial military system, perhaps it is best not to have a prescriptive approach to the subject. Addressing targets, post this identification is the next step. Herein, there may be a problem of plenty. This is the targeting conundrum for planners. Once an array has been identified for targeting, comes the issue of achieving desired effects on the target system. Concentration of force can aid effective targeting. However, the understanding of the concept of concentration also needs a fresh perspective considering the realities of any possible military contest among evenly matched opponents and limitations of resources. This article would aim to address these concepts.

CENTRE OF GRAVITY

Definitions and Interpretations

The definition of Centre of Gravity (CoG) as per JP1-02, 1994, of the US Forces is: 'Those characteristics, capabilities, or locality from which the force derives its freedom of action, physical strength, or will to fight.'¹ An updated version in JP 5-0 states, 'The COG is the source of power or strength that enables a military force to achieve its objective and is what an opposing force can orient its actions against that will lead to enemy failure.'² Milan Vego, a contemporary theorist defines it as: 'A source of "massed strength"—physical

or moral or a source of leverage whose serious degradation, dislocation, neutralization, or destruction will have the most decisive impact on the enemy's or one's own ability to accomplish a given military objective.³ These are in line with Clausewitz's view of CoG, 'The hub of all power and movement, on which everything depends.'⁴ However, Antolio views it from a different standpoint, which may be summarised as, 'Striking at the CoG with enough force will usually cause the object to lose its balance, or equilibrium, and fall. A CoG is, therefore, not a source of strength, but a factor of balance.'⁵ Apparently at variance to the above-stated definitions, an alternative view may define it as a point of Crucial Vulnerability (CV) of a Critical Capability (CC) against which a successful attack is likely to be decisive. Rationally, by mitigating the effect of the CC. The last definition identifies it as the crucial vulnerability of a critical capability; thus, it addresses an exploitable weakness of an otherwise source of strength. One may argue that it is not a definition at all but a methodology of analysis, and CoG identification may differ from its analysis. What is relevant is that considering the above-mentioned variations, there is a manifest need to come to a better understanding of the concept for application without the incumbrances of syntax and usage.

Before attempting to present a simplistic solution, it would serve us well if all students of military affairs are cognisant of what one of the modern thinkers of Operational Art, Joseph Strange, highlighted about the concept of CoG: 'The definition (of CoG) is so open to interpretation that military analysts can view the same situation in a variety of different ways in search for Centre of Gravity. Many hours are thereby wasted in fruitless discussion and argument; hours that could be better spent on planning.'⁶ While this statement sounds conclusive, it must not be treated at face value. He has written it while articulating an entire paper on the very same concept. So why identify CoG at all? The costs of war are immense and thus there is a need for efficient and expeditious prosecution of operations. The tangle methodology is to focus on the enemy's pressure points that would lead to its capitulation with minimal effort and destruction, keeping 'economy of effort' as the essence of the CoG construct. However, should this concept be focused to identify a singular entity that would lead to the adversary's capitulation? Should it translate to credible targets or should intangibles of morale, etc., form the preferred items on the list? At the operational level, it is imperative that military commanders identify the war prosecution dynamics by means of the Objectives–Tasks–Targets paradigm to maintain military focus and simplistic understanding at all levels of execution.⁷ This article would restrict

itself to this military realm. A demonstrative planning process is presented for enhanced understanding.

Planning Process

At the commencement of any operation (op), the commander and his staff will have two sets of information:

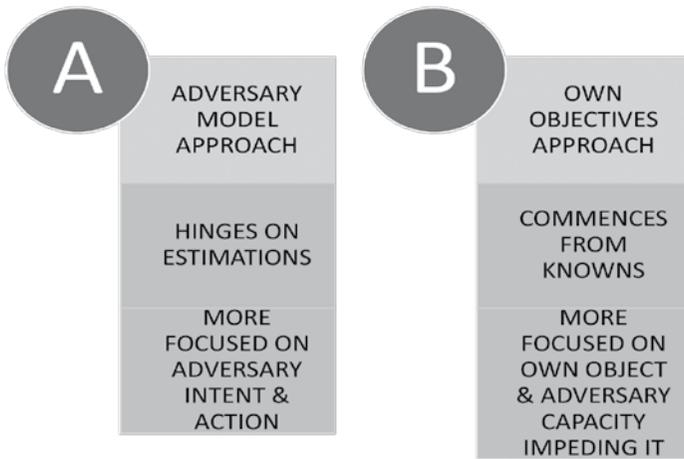
- (a) **The Knowns:** Own objectives, politico-military end state, higher directives, specified tasks, acceptable risk, etc. They are reasonably clear as they emanate from one's own warfighting organisation.
- (b) **The Unknowns:** Enemy intent, enemy objectives, methodology, level of tolerable risk, duration and acceptable losses, etc. These unknowns are estimated.

What Should Drive Operational Planning: Own Objectives or Adversary's Estimation?

When faced with uncertainty, the endeavour is to estimate the unknowns at the earliest, and to the best degree of accuracy as practicable. This is done through intelligence, logical deduction, inferences and application of professional judgement. Notwithstanding how accurately and scientifically these unknowns regarding the adversary are calculated, they would finally only be estimations and accordingly need to be treated with caution. The 'knowns', due to a higher degree of certainty and assurance, are more reliable in comparison and consequently must take precedence in the planning process. *Thus, the fountainhead of any military planning process must be one's own military objectives rather than adversary's estimates.* It is not an issue of ignoring a study of the enemy, but of relative assurance of information. The alternative approach of keeping enemy capacity, capability and intent as the centrepiece and commencing the planning process with the estimates of the enemy objectives⁸ is a problematic proposition fraught with relative uncertainty. When we predicate the planning on our own objectives rather than over-emphasise the adversary's, perhaps it also indicates a proactive and aggressive mindset. This does not imply that the adversary's estimates be ignored. Adversarial analysis for force preservation and protection, along with other important elements such as contingency preparedness, etc., remain critical. It would also play its part in influencing our own actions to maximise the probability of success with minimal costs. Should there be concurrent identification of own and adversarial information? Yes, but the context here remains relatively important when deciding offensive action to target the adversary's capacity against our military objectives *vis-à-vis* our actions to

impede the enemy achieving its own. In which, own military objectives may be given precedence over possible adversary intent, which is estimated. Table 1 juxtaposes the two approaches.

Table 1. Contrasting approaches to operational planning



A Demonstrative Planning Process

Keeping one’s own military objectives as the centrepiece, the process of planning would foremost comprise identifying the adversary’s Critical Capabilities (CCs) that impede the achievement of one’s objectives. This is the most critical step as the remaining analysis flows from this identification of the adversary’s CCs impeding our own objectives. Next would come the Critical Requirements (CRs) that enable the adversary’s CCs to function effectively. And finally, the Crucial Vulnerabilities (CVs) of the CRs that can be targeted to address the CCs. Let us consider a demonstrative example elucidated in Table 2 below. The example has been kept restrictive to the application of air power rather than a broad military theme to keep the argument aligned with the tenets of air power.

Table 2. Identification of targets through CC-CR-CV corelation

<p>Own Military Objective: For example, to degrade the offensive military capability of the adversary.</p> <p><i>There can be multiple objectives mandated. Let us consider one.</i></p>
<p><i>Thus, there may be multiple CCs of the adversary that are impediments to the achievement of our objectives. All such CCs merit analysis.</i></p>

<p>Step I - What are the Critical Capabilities (CCs) of the adversary that are preventing the achievement of own military objective?</p> <p>For example, CC 1 - Adversary's capability to deliver LR stand-off PGMs (Precision Guided Munition). Only one CC being considered. CC 2 - Adversary's ability to rapidly mobilise mechanised forces. ... and other adversary's CCs impeding own military objectives.</p>	<p>Step II - What are the Critical Requirements (CRs) for this CC to function effectively?</p> <p>Physical entities that can be viewed from a military targeting perspective.</p> <p>CRs of CC 1: CRs for this CC being analysed may include: <i>Hi Tech ac, airfield infrastructure for launch of platforms delivering PGMs</i>, PGMs at their storage sites, fuel, human resources, GPS, satellite images, etc. Remember, <i>for our demo only one CC is being considered</i>. Others need to be analysed too.</p>
<p>Step IV - Finally, Targetable Crucial Vulnerabilities are derived from the sub-components of the CRs that can yield decisive results against the CCs of the adversary.</p> <p>For example, <i>Runways</i> may be viable targets due to ease of acquisition for weapon delivery, availability of a specialised runway denial weapon and limited runway repair capability of the adversary.</p> <p>Fuel storage being overground can also be targeted due to ease of acquisition, availability of penetration weapons and limited storage capacity, which would affect the adversary's operations.</p> <p>However, <i>taxy ways may be numerous and with inherent redundancies. ATC may be shifted to a semi-buried location, making them unprofitable targets, therefore they should be rejected.</i></p>	<p>Step III - What are the subcomponents of the CRs?</p> <p><i>In the above said CC of airfield infrastructure limited CRs may be considered for ease of understanding.</i></p> <p>E.g., Runway, taxy ways, communication nodes such as the ATC and fuel storage, etc.</p> <p>Desired effect needed on CRs to negate/ neutralise/ degrade the CC to the required degree also needs to be considered. For example, in this case, cratering along length and width such that the operating platform cannot take off with requisite loads. Or fuel storage denuded to less than the fuel needed for envisaged operations in a 24-hr cycle.</p>

Note: When considering multiple military objectives and thus multiple CCs and their related CRs, one must continually identify the most important CRs that affect a diverse array of adversary CCs and thus, would prove most effective in mitigating adversary resistance and ensuring own success. Would that be the CoG?

What is the CoG in the above construct?

- (a) **Option 1: Identify the Most Important CR?** In the above analysis, having identified the CCs and CRs, one must apply judgement to pick the most important CR that is imperative for the adversary to achieve its military objectives. An adversary cannot impede one's objectives without this entity and it affects multiple CCs. In a quest for rationalising a singular CoG, one may opine that these CRs are actually pressure points that will aid the final aim of neutralising the CoG. However, by that it can be implied that one has already identified the CoG prior to the CC-CR-CV analysis, by picking out the stand out strength estimated. The question here would be how? *What is the objective, rigorous and consistent yardstick that can be applied for this CoG identification before the CC-CR-CV analysis?* Notwithstanding, if we still have to pick out a singular critical entity, it would be the CR that affects multiple CCs of the adversary. It can have multifarious effects on varied critical capacities of the opponent. This most important/interconnected CR may be termed as the CoG.
- (b) **Option 2: Focus on the CV of a CC.** The focus on CVs conceivably takes a targeting perspective. How else would an adversary's strength be mitigated except by targeting its inherent vulnerability? Divergent views can be assuaged if the terminology or 'definition' is replaced by a 'CoG addressal philosophy' executed by means of targeting the CVs of the adversary's CCs that impede the achievement of one's objectives. This can forge a common understanding and aid convergence of views regarding the CoG from a pragmatic targeting perspective. With plurality, this option appears more workable for military planning. A critical weakness or deficiency in the adversary's warfighting system also falls into this realm of exploitable vulnerability.

A Pragmatic View of CoG

- (a) **Singularity of CoG: A Wishful Illusion?** While inviting and attractive, there is a need to appreciate that the adversary will have effective redundancies and may not hinge on a single entity that provides it the strength, mass, balance and will to fight.⁹ Especially so in the case of conventional wars involving states. The pitfalls of choosing an incorrect single CoG can prove catastrophic. It can promote and propagate an unrealistic view of warfare. Col John Warden theorises that critical targets exist in the form of five different rings: Leadership, Essential Production, Transport Network, Population and Fielded Forces¹⁰ (Figure 1). It can be argued that this model requires elaboration and detailed examination, but here it is being used only to demonstrate an array of multiple targets instead of a central and singular

entity being recommended for targeting. These target rings may also translate to multiple CoGs. In fact, a closer look at the German text studied by Antulio shows that Clausewitz never used the term 'source' (Quelle). Instead, he advised tracing the full weight (Gewicht) of the adversary's force (Macht) to as few CoGs as possible,¹¹ indicating their multiplicity. In the real world, composite strength arises from the synergistic interplay of numerous elements, both tangible and intangible.

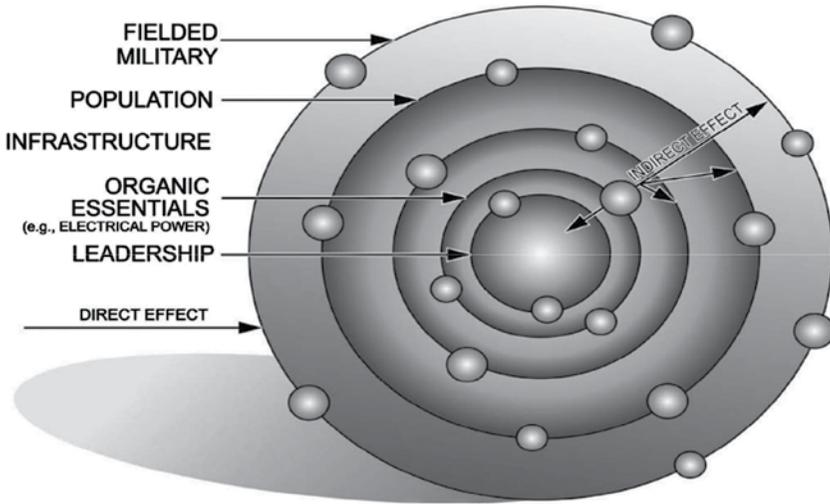


Figure 1 John Warden's five ring model

(b) **Multi-pronged Characteristics of CoGs** JP 5-0, The Joint Planning publication of USA, illustrates a diagrammatic depiction of varied characteristics that may aid in the identification of CoG. The same is reproduced as Figure 2.¹² This is a complex depiction. To find a near perfect match for these qualities would involve a significant degree of interpretation. Therefore, it also leaves substantial scope for error. In contrast, the construct that binds one's own objectives to the adversary's capacities, inhibiting their attainment is simplistic and unassuming. It leaves a lesser scope for errors while also offering greater clarity and connect. Practitioners must appreciate that warfare is ultimately profoundly complex with no simple solutions or magic bullets. The singular CoG concept at the operational level needs to be reviewed since the variables are too many, inter-dependency occluded and the effects on

the adversarial system too difficult to predict. Consequent to this analysis we can move forward with the understanding and acceptance of multiple CoGs, albeit limited and linked to our objectives and the adversary's capabilities.

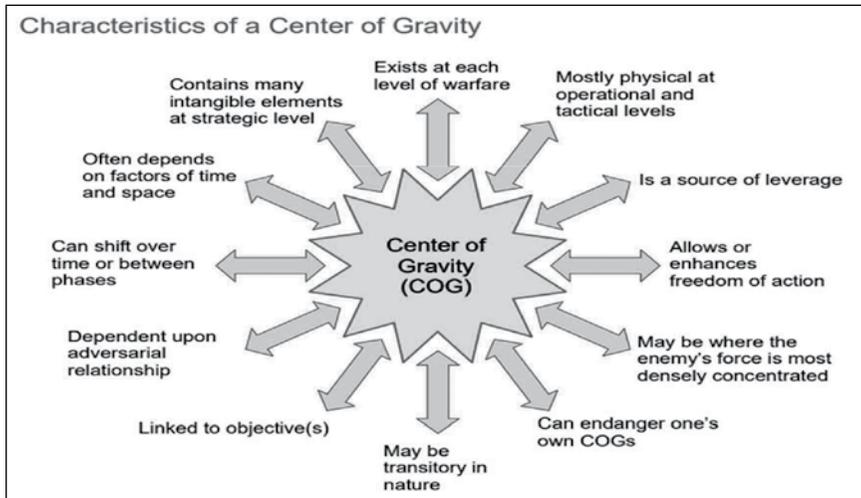


Figure 2 Complex characteristics of a CoG as per JP 5-0

- (c) **CoGs to Targets:** In consonance with the above, the planner could collate a deductive and inter-related matrix, as tabulated in Table 2. The CRs would be analysed from a targeting perspective. If they present CVs, it would make targeting relatively simpler. Notwithstanding, the CRs would still have to be targeted by creating opportunities and conditions to enable the same. The planner would have to pick and choose targets for maximising gains, amplifying effectiveness and minimising costs, while also reviewing the adversary's reactions and constantly re-evaluating the situation.

THE TARGETING CONUNDRUM

A rational and agile adversary presents multiple problems. Each warfighting machinery not only has redundancies, but the inter-relations too are hard to identify. Consequently, the adversary system presents a variety of targets that *may* appear to link with and lead to CCs but may not prove very effective in the same. With humungous costs of war, near parity with adversaries, a limited

arsenal of Precision Guided Munitions (PGMs) and sensitivity towards avoidable attrition, an air campaign would become exceedingly complex and challenging for planners. Even if PGMs were available aplenty, for a state with a formidable military-industrial complex, wasteful targeting would still not be an option. In fact, indiscriminate targeting due to state capacity can make the use of force appear wanton and disproportionate. An apt demonstration of proportionate destruction despite military capacity would be the strike against Al Qaeda mastermind Zawahiri by the US.¹³ There is a manifest need for creative calibration of force by planners and commanders who decide the munition on the target towards accomplishment of military objectives. Undoubtedly, targeting is the hardest task and requires deep thought and analysis. It is the essence of aerospace power.¹⁴

Level of Destruction

In the prevailing sub-continental conditions of matched contestants under a nuclear overhang, violence needs to be regulated to remain below the threshold and yet be effective.¹⁵ A total war by definition would mean 'military conflict in which the contenders are willing to make any sacrifice in lives and other resources to obtain a complete victory'.¹⁶ Such a course of action would not find favour with a rational strategist. The damage caused would not justify the end. It would be reasonable to state that in the contemporary scenario, use of military force would be calibrated and proportionately restricted with an aim to modify the adversary's behaviour and policies.

Targeting Contrasts

Now since the scale of violence would be judiciously restricted, so would the range, array, size, level of destruction and number of targets. It would mean that one's targeting plan has to be discriminatory, accurate and discerning. Arguably, the Balakot strike executed by the IAF would encapsulate this philosophy. A stark example to contrast the opposite would be the air raids of World War II over German cities. According to studies, stupendous amounts of air armament was dropped over German cities by the Allied forces. Hamburg received around 22,500 tons of bombs. Estimates indicate 900 tons of armament per destroyed sq km! The rate of bombing was even higher in case of Rostock on 23 and 24 April 1942, which is among the first examples of saturation bombing.¹⁷ The scale of destruction was unprecedented but wasteful. Although the bombings put a halt on Hamburg's war industries, production was recovered relatively quickly. By the end of 1943, the aircraft industry was operating at 91 per cent of pre-bombing levels, the chemical

industry returned to 71 per cent of pre-bombing capacity and the submarine-building industry returned to near pre-bombing capacity within two months.¹⁸ This example of World War II was taken to highlight an extremity, so any lamentation that this usage is anachronistic and technological advancements such as PGMs can preclude such a scenario of inaccurate bombardment can be justified to some degree. Therefore, such a view needs to be addressed forthwith.

PGMs: The Panacea?

Foremost, we must never forget that war has an enduring nature as per Clausewitz himself.¹⁹ In fact, some lessons of war stand the test of time and incorrect priorities may be one of them. The US, with the enormous differential of scientific research and military might, failed remarkably in Vietnam, Iraq and Afghanistan. A telling critique can be found in the book by James H. Lebovic.²⁰ More specifically, the limitation of air power against ground forces has been discussed at length by Daryl G. Press.²¹ He also analyses two of the most detailed studies of aerial warfare, the Gulf War Air Power Survey (GWAPS) and the RAND book *A League of Airmen*. They too reach the same conclusion.²² Therefore, wisdom cannot be ignored citing vintage. On the contrary, with the human propensity to repeat mistakes, it tends to be durable. Yes, today's PGMs with their accuracy and specialist payloads have the capacity to make individual attacks conclusive to some measure, reduce target re-visits, aid in high concentration of explosive power and reduce collateral damage significantly. Yet, there is adequate evidence that armament efficiency has to be directed at the correctly chosen targets to achieve the intended results. Moreover, it would be practical to assume that apart from states with the comparable military industrial complex and economic might of the US, most states do not have a nearly inexhaustible supply of PGMs available for a conflict. Furthermore, while PGMs with their pin-point accuracy appear to be a technological solution towards the achievement of concentration of force, how would this concentration be defined and understood?

Concentration of Force

Concentration of Force is a principle of war and there is no substantial debate on its relevance. However, we must remember that principles need intelligent application with an eye for situations. In fact, there are many occasions that merit a considered disregard for the said principles. Dispersion for security will entail a compromise on concentration. When we concentrate, we may

be compelled to compromise on the element of surprise. For terrestrial warfare, discounting the exceptions where manoeuvre has worked despite a large differential of numbers, in most cases, concentration has been the act of bringing to bear numbers and firepower superior to that of the adversary at the point of geographic application. This concept may not be effective in isolation when applying air power. Mahan explains concentration quite differently, 'Such is concentration reasonably understood—not huddled together like a drove of sheep, but distributed with a regard to a common purpose.' Corbett established a similar assessment of 'intelligent division' as being central to the idea of concentration.²³ This understanding needs nuanced application when viewed from an aerospace perspective.

Problem with Concentration in Time and Space

What happens when one concentrates aerospace power in time and space? A large contingent of platforms and firepower gets concentrated on a given target system in a constricted time frame and localised geographic area. This ensures adequate weight of attack over targets to cause the intended degree of damage. Numbers and capabilities ensure mission success, and a large number of diverse targets are addressed near simultaneously. Planning would entail a large Composite Offensive Air Package (COAP) to attack a target system appreciated to be critical to the warfighting capacity of the adversary. It would be defended, and consequently, would require an adequate number of platforms executing complimentary missions to ensure a successful attack. With this methodology what actually happens is akin to large-scale area bombing. A diverse array of targets is hit with distributed weapon load. Perhaps the reduced payloads due to a large number of targets may even result in reduced degree of damage. Consequently, requiring revisits, post damage assessment. The same may be precluded by use of PGMs, but they are limited in number. So, the issue of the choice of targets in that target system remains central, and herein lies the problem.

Concentrated Application of Aerospace Power in Purpose

Possible targets of strategic or military value are seldom concentrated by any cogent adversary, unless situationally forced to do so. Therefore, when any such value targets, dispersed by design, are attacked through the medium of air, it may appear to be geographically distributed. It may also be beneficial that such targets are engaged with simultaneity to shock the adversary and degrade his response. Therefore, concentration in air warfare, apart from

being linked to space or geography, would also be intricately linked to timing. Instead of addressing a varied array of targets in a limited geographic extent, actual concentration would be achieved if similar and interlinked targets are attacked even over a wide geographic expanse simultaneously. The doctrine of the IAF alludes to the said philosophy of concentration, although without further elaboration: ‘it is better to concentrate decisive fire power on crucial locations and vulnerabilities to achieve the desired effect... changed the focus from the earlier concept of concentrating mass to achieving concentration of force and application of decisive firepower. Effects and not mass lie at the heart of concentrating aerospace power.’²⁴ There is a need for an enhanced understanding of the same. Perhaps the terminology can be refined to concentration of effects. This terminology of effects may lead to envisaged sequential and ordered effects professed by Deptula²⁵ in the framework of Effects Based Operations. However, in the present example it may be viewed in the context of physical targeting being discussed. Further, this concentration of purpose over distributed target systems by no means undermines the need to have appropriate tactical force ratios for package survivability in an air engagement. This aspect of tactical packaging is inescapable.

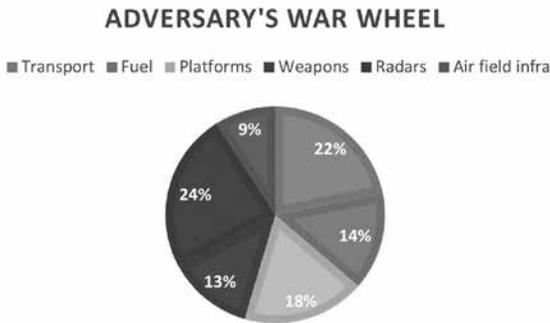
Concentration in Practice

Possony remarks that large-scale bombing led to unrelated kinds of targets getting bombed with inadequate bomb loads. He analyses that bombing of different industries at the same time cannot vitally affect any of them. While the exclusive bombing of one selected industry brings better results as it destroys one complete link in the adversary’s production chain.²⁶ He also cites the report of General Arnold that illustrated one such critical facet of the German war capacity—the electric power sources that could paralyse the adversary. The report emphasises the need for this destruction to be concentrated in time, “... spread the same destruction over a 12-month period and the story is different... given enough time the adversary can recover from anything.”²⁷ The following can elaborate the concept of selective and concentrated destruction versus dispersed degradation. It would also highlight why targets need to be closely connected through function.

Illustrative Example of Concentrated Destruction

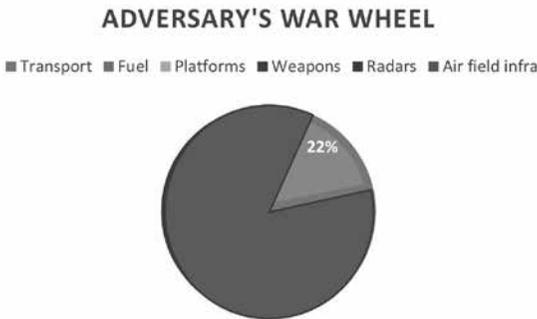
Consider the adversary’s warfighting machinery to be a wheel with the spokes supporting the outer rim, which aids its movement and functionality.²⁸ This war wheel model of an adversary is depicted in Figure 3. Spokes are

demonstrative elements of the adversary’s warfighting apparatus. The whole idea of targeting and degrading this wheel as a whole is to cause a disbalance in movement and function. This can be achieved by significant indentation of the circumference when localised in one segment, as illustrated in Figure 4. This is less likely in case of an even degradation of all the segments supporting and comprising the wheel. Although the reduced circumference would decrease overall effectiveness, the war wheel as an organic whole would remain utilitarian, avoiding a breakdown as the indentations are limited and dispersed, shown in Figure 5. A comparison of figures 3 and 4 clearly indicates that the probability of dysfunctional failure is high if the former approach is adopted.



The war wheel moves smoothly as the rim is supported by the load bearing segments represented by Transport network, Fuel, Platforms, Weapons, Radars and Airfield Infra of the adversary. The more basic and ubiquitous the element, larger the segment and circumference it supports. (The list of elements is demonstrative.)

Figure 3 War Wheel Model



Now, let us examine **selective and concentrated targeting**. Assume that the transport capacity of the adversary has been knocked off completely by air attacks. The war wheel now is missing the entire segment comprising a demonstrative value of 22 per cent. It would become increasingly difficult for this wheel to function effectively! Similar logic of degradation may be applied to the other elements.

Figure 4 War wheel indentation due to concentrated targeting



In contrast, had the air offensive caused **dispersed degradation** across the warfighting elements it would have caused spread denudation in functionality of the wheel. Thus, the adversary would have a higher chance of recuperation and recovery. True concentration would not have been achieved in such a targeting scenario.

Figure 5 War Wheel indentation post dispersed degradation

Considering the precepts of concentration discussed before and the war wheel depiction of degradation, it can perhaps be theorised that the key to effective targeting may be understood as the ability to create concurrent, conflicting and competing demands on the adversary's warfighting machinery. The effect that needs to be created is beyond simultaneity. Let us dissect the three terms used here to understand the creation of these demands and the effect thereof.

- **Concurrent:** This refers to simultaneity, constricting the time for infliction of damage and then available for any reaction or recuperation. Even if similar and inter-connected targets were chosen but addressed over a spread timeline, the effect would be lost.
- **Conflicting:** This indicates similarity, if not congruence, in the demands generated by targeted entities for restoration. Even if the targets were struck simultaneously and in close vicinity but the restorative demands differed significantly, again, the targeting effectiveness would reduce.
- **Competing:** Indicates the need for the resource provider to choose and prioritise satisfaction rate in a discriminatory manner. The demands can possibly not be met for all the entities clamouring for the same/similar resources for recuperation.

A Demonstrative Targeting Scenario

To exemplify the above, let us imagine a scenario with two options. A series of COAPs attack a target cluster comprising two air bases in the same sector. Six PGMs are delivered in these raids, other non-precision armament has been ignored for the instance. The target selection and timelines of delivery

differ, and therein lies the difference, as tabulated below. The considered content is only demonstrative to contrast the dissimilarities of the two approaches; it is not intended to profess the tabulated weight of attack for the said targets, the targets themselves, recuperation times or the weight of attack of an actual COAP.

Table 3. Scenarios of differing targeting models

Scenario 1	Scenario 2
<p>Targets with Varied Functionality PGM 1- Runway of air base 1 PGM 2- Bulk fuel storage air base 2 PGM 3- Semi buried C2 centre air base 1 PGM 4 - Armament storage area air base 2 PGM 5 - Hardened aircraft shelter air base 1 PGM 6 - Radar unit air base 2 (Targets would affect dispersed functional entities)</p> <p>Times Over Targets: D Day: PGM 1,2 - 0600 Hrs, D+1 PGM 3,4 - 1000 Hrs, D+2 PGM 5,6 - 1400 Hrs</p>	<p>Targets Closely Connected by Function PGM 1- Fuel pumping station main base PGM 2, 3 - Bridge on highway used to supply fuel tankers to both the air bases. PGMs 4, 5 - Bulk fuel storage at main base PGM 6 - Fuel pumping station auxiliary base (Targets would affect one critical aspect—Fuel)</p> <p>Times Over Targets: D Day: PGM 1 - 0600 Hrs, PGM 2,3 - 0600 Hrs, PGM 4,5 - 0600 Hrs, PGM 6 - 0600 Hrs. ✓ CONCURRENT</p>
<p>Restorative demands varied due varied targets—non-conflicting. No need of discriminatory prioritisation and possibly no denial in provisioning of support due to differing non-competing demands.</p> <p>Degradation and Recuperation: Runway: Repaired in 3 hrs post raids Bulk fuel installation: degraded by 10 per cent</p>	<p>Demands focussed on one critical element—Fuel, thus conflicting. Simultaneous fuel shortages at both bases would result in competing demands and need for discriminatory prioritisation.</p> <p>Degradation and Recuperation: Fuel pumping station: Pumping units damaged at both bases. Reduction in capacity 20 per cent</p>
<p>C2 Centre: Limited effect due buried structure HAS: 01 ac destroyed Radar: 01 antenna destroyed. Replacement 24 hrs</p>	<p>Bridge: NA for fuel tankers for 48hrs Fuel storage: 20 per cent degraded at main base</p> <p>✓ CONFLICTING and COMPETING</p>

<p>The <i>degradation is distributed</i> over a large spread of targets and elements supporting the warfighting effort. This affords a high probability and capacity for recuperation.</p> <p>What if all 6 PGMs were directed only on one critical warfighting element simultaneously?</p> <p>Like the weapon storage areas of both these bases instead. It may have been much harder for the adversary to cater to this loss of critical resource concurrently for both the bases.</p>	<p>Due to <i>concurrent, conflicting and competing demands</i> related to only one critical element, the adversary's capacity to recuperate and restore functionality is denuded.</p> <p>Imagine, simultaneously additional COAPs address similar targets related to fuel infrastructure such as bulk storage tanks in sectors adjoining these two bases.</p> <p>Would it not have amplified the effects?</p>
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Joint Concentration and Integration

Let us rewind the discussion to when we identified a CR with multifarious effects on the adversary's CCs. Let us assume that in the example above, we identified such a CR of the enemy. Once identified, an integrated plan must be formulated to address its CVs by all available means at one's disposal to achieve the best possible outcome. Kinetic tools of air launched PGMs, artillery, special forces, surface-to-surface missiles (SSMs) and ship/submarine-borne weapons along with non-kinetic attacks need to be synergised to achieve the concentration in purpose.²⁹ This joint application³⁰ can yield exponential results. If the said synergy can be extended to the realm of integration of all military and non-military national elements it would prove even more effective. However, for the scope of this article, the argument would be restricted to the military elements. In the said scenario of COAPs targeting fuel infrastructure, if the surface forces target forward-located fuel dumps feeding the tactical battle area and the maritime forces with coordinated air action addressing strategic port infrastructure facilitating petroleum import simultaneously, this concentration would cause amplified effects. Similar and inter-related targets would be attacked simultaneously, across geography, through the levels of military conflict and to a common purpose. The scenario is illustrated in Figure 6. This stupendous application of force in unified purpose, despite geographic dispersion, would perhaps drive the adversary's war machine to failure due to demands beyond its capacity.

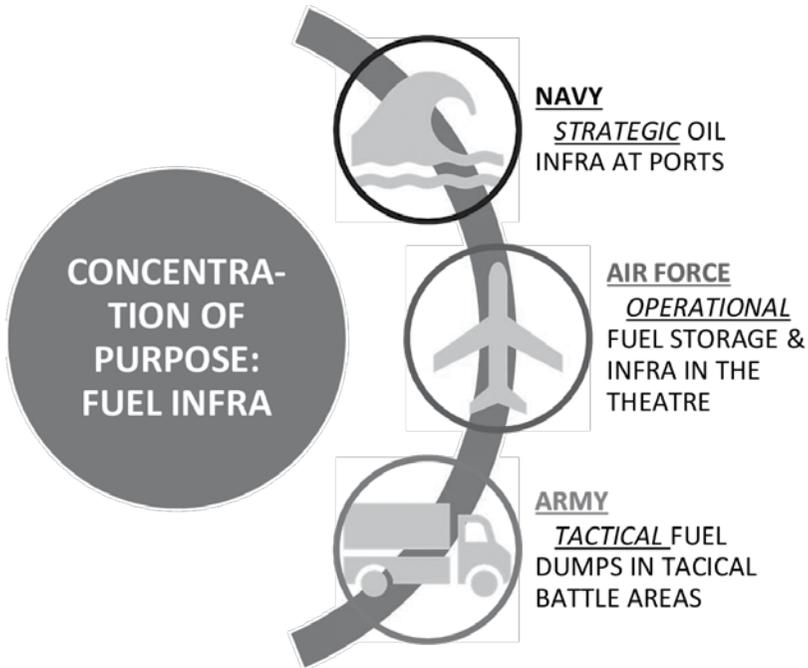


Figure 6 Concentration in purpose by joint targeting at all three levels of warfare

Historical precepts and the above-mentioned practical application indicate that limited degradation of multiple elements can be absorbed by a responsive adversary, especially over a protracted time frame. It is the simultaneity of similar demands that offers a high probability of overloading the system to failure. It has been highlighted by strategists such as Possony and recognised in wargames as well³¹ that it is more beneficial to degrade a target substantially than to spread one's effort thin and degrade numerous targets to an inadequate degree. Therefore, for aerospace power to work most efficiently, concentration must be achieved in terms of Force, Time, Space and Purpose. Selective and concentrated effects in this respect can be achieved by creating concurrent, conflicting and competing demands on the adversary. The blend of said aspects presents the opponent with numerous complications, forces it to be reactive, leads it to untenable positions and enhances the possibility of making grave mistakes.

SUMMATION

- (a) Military planning, due to higher reliability of information, needs to commence by prioritising one’s own military objectives and identifying CCs of the adversary impeding our objectives, rather than from the estimations of adversary’s intent.
- (b) Thereon, judgement and rigorous analysis needs to be applied to these CCs to deduce their CRs and finally the CVs, which need to be targeted.
- (c) These targets must be related in function and therefore in purpose, to aid concentration. Aim for selective and concentrated destruction by creating concurrent, conflicting and competing demands for the adversary.
- (d) Singular CoG may be treated with caution. CRs that demonstrate the most critical inter-dependencies to varied CCs of the enemy may be treated as CoGs. The staff and commanders must be alive to military entities that exhibit such multifarious capacity as they may lead to an early capitulation. Their criticality may emerge during initial analysis, but new ones may arise as the operations progress. They may also change if one’s own aims and objectives are recalibrated. Figure 7 elucidates the planning loop.

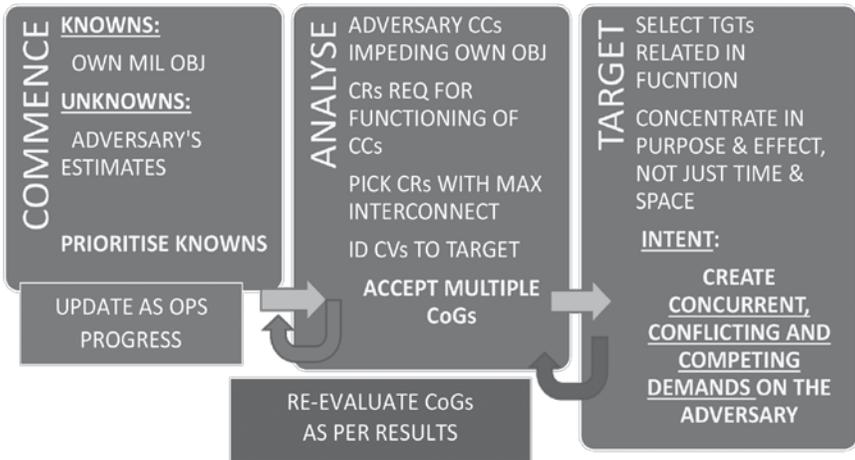


Figure 7 Process leading to selective and concentrated targeting

CONCLUSION

Appreciation of the nebulous nature of the concept of CoG and acceptance of its multiplicity in the face of a rational adversary, uncertainties of war and inadequacy of data is perhaps a pragmatic view of recognising the complexities

of warfare. Selection of identified adversarial capabilities impeding the achievement of one's objectives and concentrating force beyond just time and space but in purpose and effect would be imperative for any military victory. A nuanced understanding of the concept of concentration, therefore, is vital. This can result in better prosecution of the air strategy and an integrative approach to targeting in an era of limited resources and possible contestation with adversaries who demonstrate near parity of forces.

NOTES

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27. *Ibid.*
28. *Ibid.*, p. 111. The concept was illustrated by Possony albeit with a differing representation. The same has been modified for ease of understanding and application.
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30. JP 01/2017, 'Joint Doctrine: Indian Armed Forces', Chapter 5, Section 1 elaborates jointness and integration. As per the Joint Doctrine, jointness implies possessing an optimised capability to engage in joint war-fighting. Cooperative centralised planning enables the appropriate concentration of forces, with the right mix at the right time and place. With jointness, a high level of cross-domain synergy is attained and vastly enhances success potential. Integration, on the other hand, is used in reference to the integration of processes across all operational domains of land, air, maritime and cyberspace. It is embodied in all functions: operations, intelligence,

technology management, etc. It does not imply physical integration. Beyond the Armed Forces it also mentions collaboration with DIME instruments of National Power. Integration also leads to optimisation of resources and outputs. Thus, to conform to the military scope of the article, the term 'joint' has been considered appropriate, while the word integration has been used for a broader scope.

31. Wargames and exercises over the 77th and 78th Staff Course at Defence Services Staff College witnessed by the author demonstrated the effectiveness of concentrated targeting and its effect on subsequent recuperation during professional discussions and software-modelled results for game adjudication.