CATALYSING MULTI-DOMAIN COMBAT TRAINING

The fast changing character of warfare has led to re-examine training philosophies and adopt simulation-led ecosystems that are continuous, scalable and analytically rigorous. At the centre stage of this transformation is Live–Virtual–Constructive Integration which offers a pathway to realistic, joint and continuous preparedness

SHANTANU GUPTA

The character of warfare is undergoing a phenomenal shift. Military operations today are no longer confined to single platforms or domains, but are executed across land, air, maritime, cyber, space and the information environment, more often than not simultaneously and at machine speed. In such a context, preparedness is determined not only by what a force operates, but by how effectively it trains to think, decide, and act as an integrated system. From an industry perspective, this reality places training, and the associated enabling technologies, at the centre of defence capability development.

TRAINING MUST REFLECT THE REALITY OF MODERN CONFLICT

Traditional live training remains indispensable, but it faces inherent constraints. Large-scale exercises are resource-intensive, episodic, geographically bounded and often unable to replicate the full cognitive complexity of modern operations. The ambiguity, information overload and compressed decision cycles that define real conflict are difficult to reproduce consistently through live means alone. This has led

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advanced militaries worldwide to re-examine training philosophies and adopt simulation-led ecosystems that are continuous, scalable and analytically rigorous. The objective is no longer limited to platform proficiency; it is about developing decision superiority, jointness and adaptability across the Armed Forces.

LIVE – VIRTUAL - CONSTRUCTIVE INTEGRATION AS A CORE PHILOSOPHY

At the centre of this transformation is Live – Virtual - Constructive (LVC) integration, a

ENERGISING THE TRAINING CONTINUUM

Indigenous training systems increasingly handle sensitive operational data, doctrinal logic and decision patterns. Ownership of design, data and intellectual property is therefore critical, not only for security, but also for adaptability and long-term sustainability

training philosophy that connects different modes of simulation into a single, coherent ecosystem. Live training involves real troops operating real equipment in physical environments.

Virtual training places real operators inside simulated platforms and environments, allowing them to practise missions, procedures and decision-making virtually, without deploying actual assets.

Constructive simulation, also known as Wargaming, which traditionally used maps and sand models, have now evolved into software based system to model combat unit, equipment and logistics at scale, enabling commanders and staffs to validate and practice doctrines as well as operational plans.

Incidentally, these are siloed and take place independently. When integrated, these domains create a single synthetic battlespace where actions and decisions interact across levels of command.

An LVC ecosystem allows a live unit in the field, virtual crews in simulators, and AI-powered constructive forces to operate together in real time, on common operational scenarios. Tactical actions influence operational outcomes, while strategic decisions cascade down to affect frontline engagements. This mirrors the interconnected nature of modern warfare far more accurately than isolated training systems. LVC integration powers joint mission planning and rehearsals, multi-domain experimentation, and large-scale decision training—without the cost, risk or disruption associated with full live deployments.

SIMULATION AS AN END-TO-END DEFENCE CAPABILITY

Progressive defence forces increasingly view simulation not as a standalone product, but as a capability embedded across the defence lifecycle. Simulation supports concept development and experimentation, enabling doctrines and force structures to be tested before induction. It underpins training and skill progression, allowing

continuous learning rather than event-based instruction. It facilitates platform induction and upgrades, reducing learning curves and operational risk. It enables mission rehearsal and validation, and generates data-driven performance insights that inform both training outcomes and operational planning.

The convergence of artificial intelligence, digital twins, immersive interfaces and advanced analytics has significantly expanded the scope of simulation. Modern systems can adapt scenarios dynamically, model intelligent adversary behaviour and capture objective performance data. Within an LVC framework, these capabilities converge to create a continuous learning loop, linking individual proficiency with collective readiness in one domain, as well as rehearsing various arms/ branches in the other domain.

BREAKING SILOS & INTEGRATING TRAINING — Tecknotrove

NON KINETIC OPERATIONS

STRATEGIC OPERATIONS

TACTICAL OPERATIONS

WHY INDIGENOUS CAPABILITY MATTERS

The strategic importance of indigenous simulation capability cannot be overstated. Synonymous with technological sovereignty, it elevates Aatmanirbharta and adds on to strategic capabilities.

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India's Aatmanirbhar Bharat vision recognises this imperative. Indigenous capability is not about isolation; it is about strategic autonomy, resilience and global competitiveness. It requires sustained investment, risk appetite and a willingness to build deep technology stacks rather than assemble solutions. At Tecknotrove, this philosophy has been our DNA ever since inception. With 100% indigenous design and development and full intellectual property ownership, the company has invested consistently in building simulation technologies across Defence, Aviation, Mining, Construction, Driving and Logistics sectors. Our focus has been on modular architectures, open systems and LVC-ready designs that can evolve with changing doctrines and technologies.

The fact that our solutions are today exported to over 30 countries underscores that indigenous capability, when built with quality and vision, is globally competitive.

INVESTING FOR THE FUTURE

Building advanced simulation ecosystems is not a short-term endeavour. It demands long-term investment in R&D, talent, and infrastructure, as well as close collaboration with users to understand operational realities. As warfare continues to evolve, training systems must remain flexible, interoperable and data-centric. Indigenous industry has a critical role to play in ensuring that defence forces are not only equipped for today's challenges, but prepared for tomorrow's uncertainties.

CONCLUSION

The effectiveness of future armed forces will be shaped as much by training ecosystems as by platforms. Integrated Live–Virtual–Constructive simulation offers a pathway to realistic, joint and continuous preparedness.

From Tecknotrove's perspective, our vision has been unambiguous: to invest early in indigenous capability, to own critical design and intellectual property, and to build training systems that convert precision in preparation into operational excellence.

Precise today. Perfect tomorrow.

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–The writer is Founder and Director of Tecknotrove Systems India Pvt Ltd. The views expressed are of the writer and do not necessarily reflect that of Raksha Anirveda