डा0 ए0पी0जे0 अब्दुल कलाम प्राविधिक विश्वविद्यालय

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सेवा में,
निदेशक/ प्राचार्य/ अधिष्ठाता
संबद्ध संस्थान, डा० ए०पी०जे० अब्दुल कलाम प्राविधिक विश्वविद्यालय, लखनऊ

विषय: भारतीय सेना द्वारा निर्गत Compendium of Problem Definition Statements (CPDS) 2025 में सहभागिता हेतु आमंत्रण

महोदया/महोदय,

आपको यह सूचित करते हुए हर्ष हो रहा है कि भारतीय सेना के Army Design Bureau (ADB) द्वारा Compendium of Problem Definition Statements (CPDS) 2025 का सातवाँ संस्करण जारी किया गया है। CPDS 2025 में युद्ध एवं रक्षा प्रौद्योगिकियों के 11 महत्वपूर्ण क्षेत्रों में कुल 82 प्रॉब्लेम स्टेटमेंट एवं उनका विवरण अंकित हैं, जिनमें आर्टिफिशियल इंटेलिजेंस, साइबर एंड सॉफ्टवेयर सिस्टम्स, अनमैन्ड सिस्टम्स, सेंसर्स, आर्मामेंट, लॉजिस्टिक्स, मोबिलिटी, सर्वाइवबिलिटी एवं इंडिजिनाइज़ेशन आदि प्रमुख हैं। ये समस्या विवरण भारतीय सेना के वास्तविक परिचालन चुनौतियों पर आधारित हैं तथा अकादमिक संस्थानों, स्टार्टअप्स, इनोवेशन एवं विकास संस्थानों तथा उद्योग जगत से नवाचारी, स्वदेशी एवं स्केलेबल समाधान विकसित करने के उद्देश्य से तैयार किए गए हैं।

इस प्रतियोगिता में निम्न लोग प्रस्ताव प्रेषित कर सकते हैं:

- स्नातक एवं परास्नातक विद्यार्थी
- शोधार्थी
- संकाय सदस्य
- इनक्यूबेटेड एवं नॉन-इनक्यूबेटेड स्टार्टअप्स
- संस्थान के अंतर्गत नवाचार एवं R&D टीमें

CPDS 2025 में सहभागिता के लाभ:

- नेशनल इम्पोर्टेंस की लाइव प्रॉब्लम स्टेटमेंट्स पर काम करने का अवसर
- इवैल्यूएशन के दौरान इंडियन आर्मी के डोमेन एक्सपर्ट्स के साथ डायरेक्ट इंटरफ़ेस
- आर एंड डी प्रोजेक्ट्स, प्रोटोटाइप डेवलपमेंट, ट्रायल्स एवं प्रोक्योरमेंट की व्यापक संभावनाएँ
- आर्मी टेक्नोलॉजी बोर्ड (ATB), iDEX, मेक-I/II एवं अन्य डिफेन्स इनोवेशन स्कीम्स के अंतर्गत फंडिंग एवं सपोर्ट के अवसर
- डिफेन्स क्षेत्र में आत्मनिर्भर भारत के नेशनल विज़न में सक्रिय योगदान
- रियल-वर्ल्ड डिफेन्स चैलेंजेस के माध्यम से स्टूडेंट्स एवं फैकल्टी के लिए अकादमिक एवं रिसर्च एनरिचमेंट

पात्रता:

- शैक्षणिक संस्थान: यूनिवर्सिटीज़, कॉलेजेज़ एवं रिसर्च सेंटर्स
- स्टार्टअप्स एंड इंडस्ट्री: इंडियन-रजिस्टर्ड स्टार्टअप्स, MSMEs एवं डिफेन्स कंपनियाँ
- आर एंड डी ऑर्गनाइज़ेशन्स: गवर्नमेंट एवं प्राइवेट रिसर्च ऑर्गनाइज़ेशन्स

सॉल्यूशन्स टेक्नोलॉजी रेडीनेस लेवल (TRL) 3 से 7 तक हो सकता है, अर्थात प्रूफ-ऑफ-कॉन्सेप्ट से लेकर डेवेलप्ड प्रोटोटाइप स्टेज तक के प्रस्ताव दिए जा सकते हैं।

आवेदन की प्रक्रिया:

1. इच्छुक टीमें CPDS 2025 दस्तावेज़ का गहन अध्ययन कर अपनी विशेषज्ञता के अनुरूप समस्या परिभाषा विवरण का चयन करें।
2. प्रस्ताव CPDS 2025 के *Appendix-A* में दिए गए निर्धारित प्रारूप में ही तैयार किया जाएगा।

3. प्रस्ताव ई-मेल के माध्यम से **cpds.proposal@gov.in** तथा संबंधित PDS में उल्लिखित द्वितीयक ई-मेल पते पर भेजा जाएगा।
4. संबंधित **PDS** में उल्लिखित सेकेंडरी कॉन्टैक्ट ई-मेल पर भी भेजा जाए, जिसमें सब्जेक्ट लाइन में स्पष्ट रूप से लिखा हो: **"प्रपोज़ल फॉर PDS नं. ___ फॉर CPDS 2025"**
5. सभी प्रस्ताव *unclassified* प्रकृति के होने चाहिए तथा Army Design Bureau द्वारा गोपनीय रूप से रखे जाएंगे।
6. प्रस्तुतिकरण, मूल्यांकन एवं चयन से संबंधित विस्तृत दिशा-निर्देश संलग्न CPDS दस्तावेज़ में उपलब्ध हैं।

प्रस्ताव जमा करने की अंतिम तिथि:

प्रस्ताव प्रस्तुत करने की समय-सीमा एवं अंतिम तिथि Army Design Bureau द्वारा भारतीय सेना की आधिकारिक वेबसाइट/CPDS दिशानिर्देशों के माध्यम से अधिसूचित की जाएगी। संस्थानों से अनुरोध है कि वे आधिकारिक ADB अधिसूचना में उल्लिखित समय-सीमा के भीतर शीघ्र प्रस्तुति सुनिश्चित करें।

संपर्क विवरण (SPOC):

अधिक जानकारी हेतु संलग्न CPDS 2025 ब्रॉशर देखें अथवा भारतीय सेना के Academia Wing से दूरभाष 011-23333805 अथवा ई-मेल adbacademia-392@gov.in पर संपर्क करें।

अतः अनुरोध है कि इस सूचना का अपने संस्थान में व्यापक प्रसार करें तथा इस प्रतिष्ठित राष्ट्रीय पहल में अधिकतम सहभागिता सुनिश्चित करें।

भवदीय,

07/01/2026

(प्रो0 भारतेन्दु नाथ मिश्र)
अधिष्ठाता इनोवेशन एवं सोशल एंटरप्रेन्योरशिप

प्रतिलिपि:

1. वित्त अधिकारी, डा० ए०पी०जे० अब्दुल कलाम प्राविधिक विश्वविद्यालय
2. कुलसचिव, डा० ए०पी०जे० अब्दुल कलाम प्राविधिक विश्वविद्यालय
3. स्टाफ ऑफिसर, माननीय कुलपति महोदय के सूचनार्थ प्रेषित

(प्रो0 भारतेन्दु नाथ मिश्र)
अधिष्ठाता इनोवेशन एवं सोशल एंटरप्रेन्योरशिप

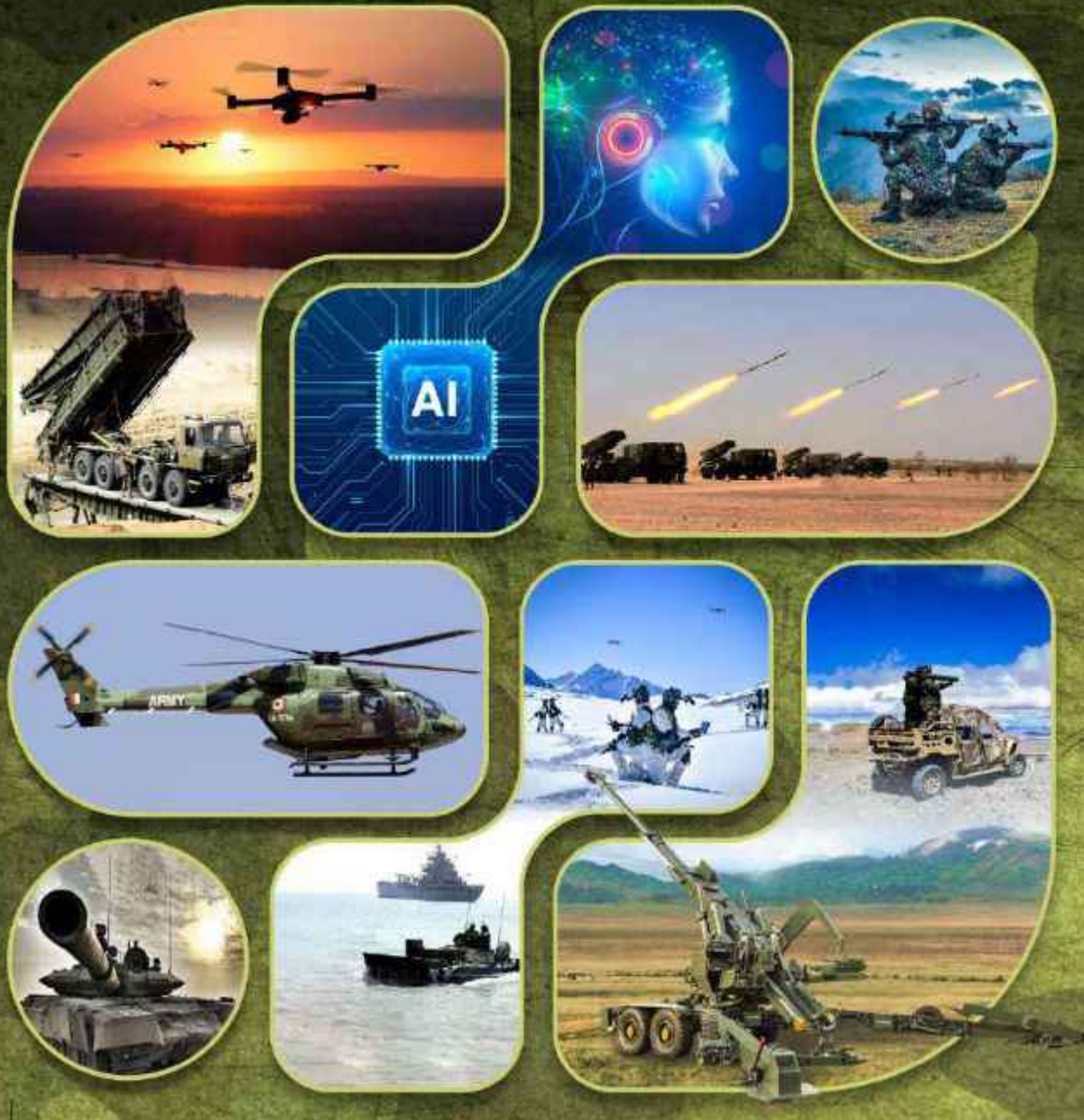
ARMY DESIGN BUREAU
Connecting Capabilities

FICCI

VIITH EDITION

COMPENDIUM OF PROBLEM DEFINITION STATEMENTS 2025

INDIAN ARMY

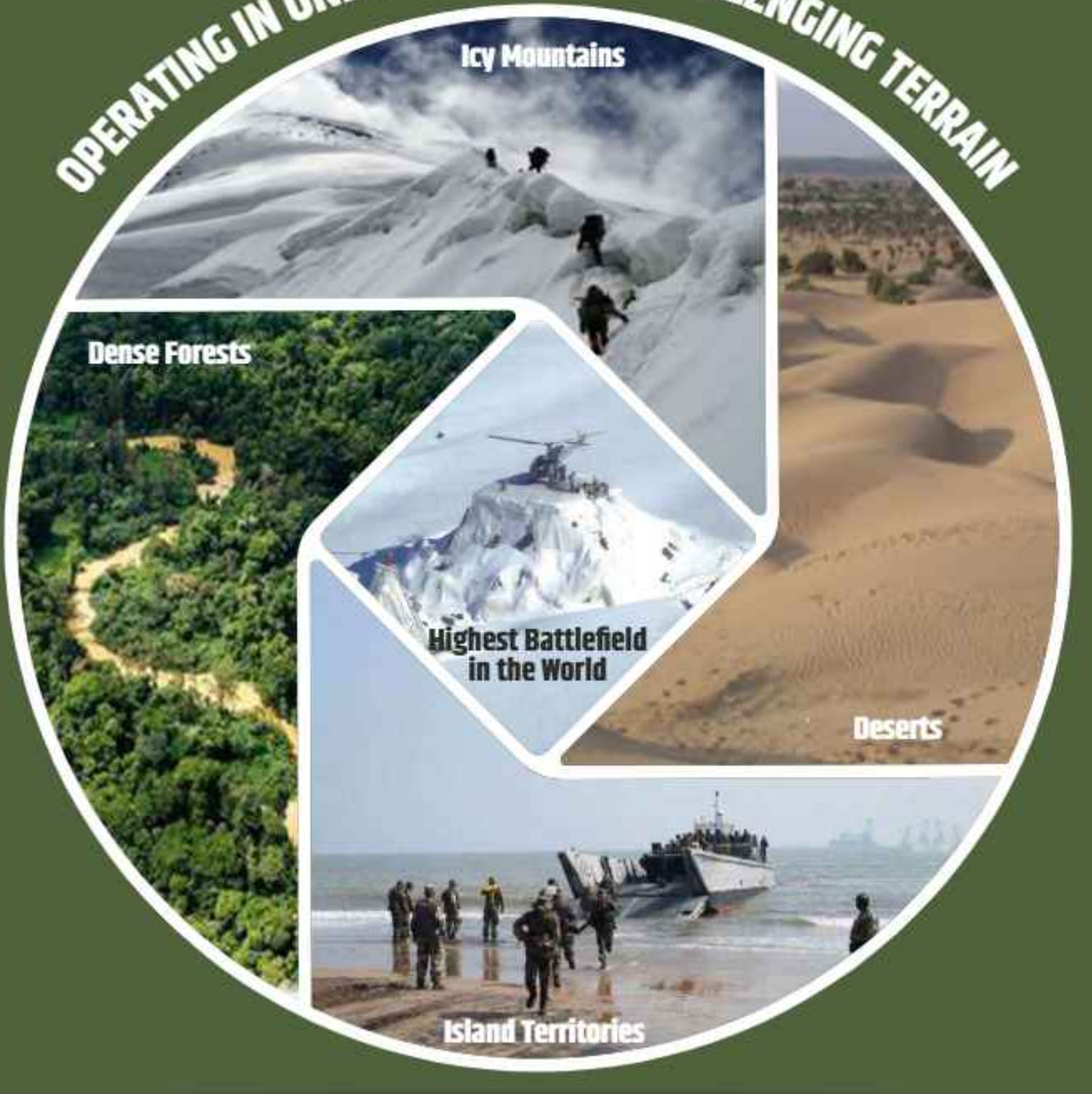


Indigenise to Modernise

स्वदेशीकरण से सशक्तिकरण

INDIAN ARMY

OPERATING IN ONE OF THE MOST CHALLENGING TERRAIN

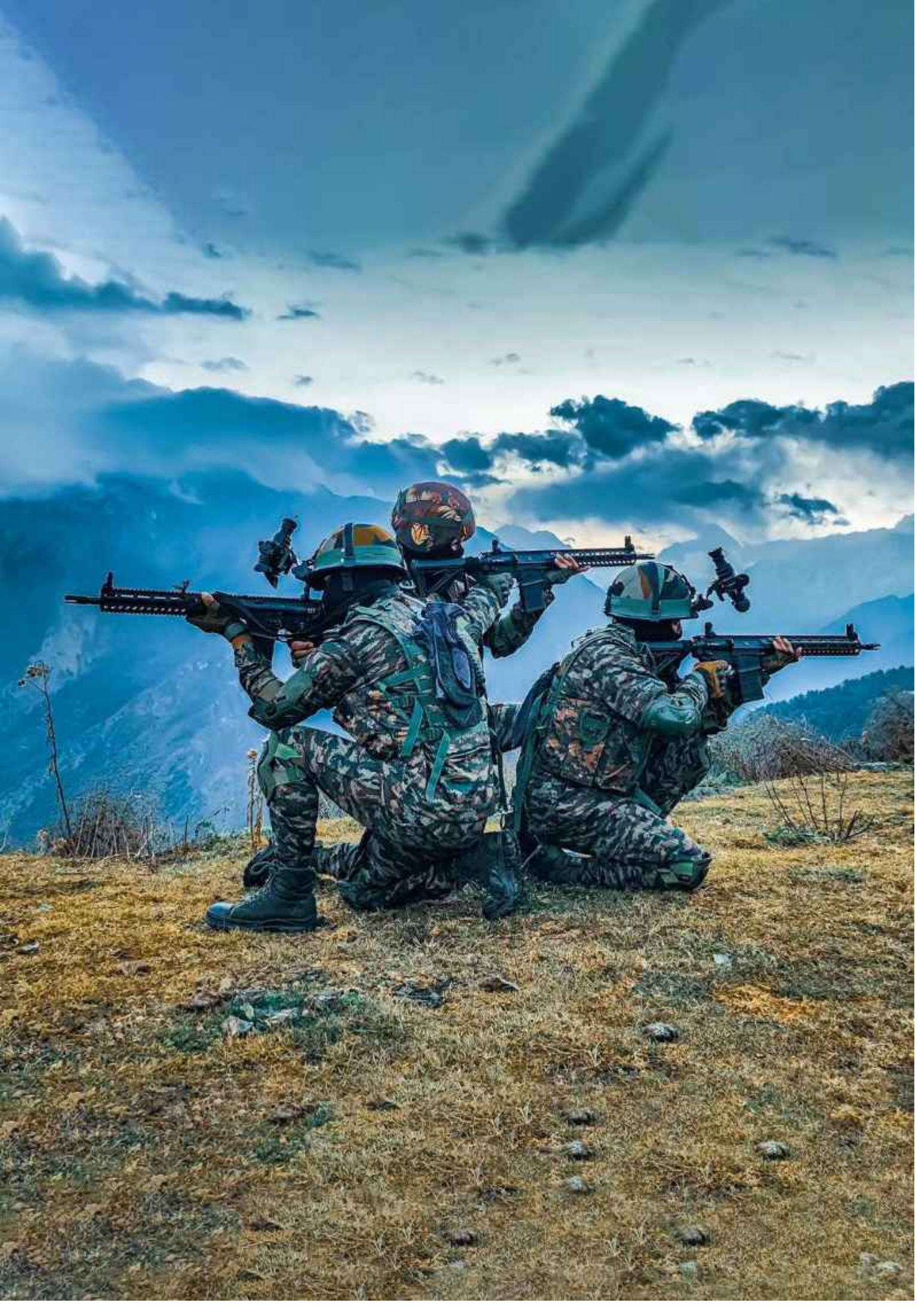


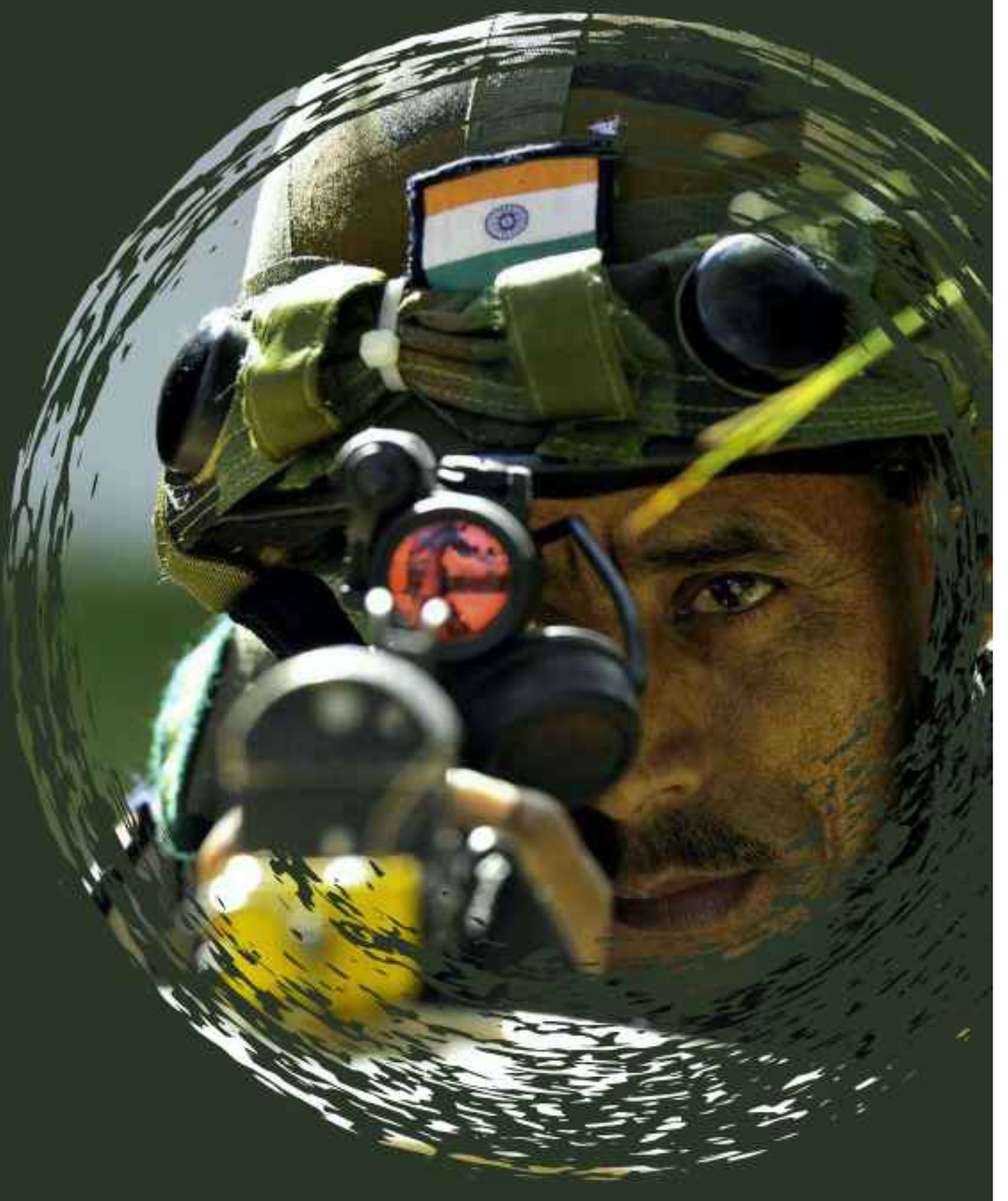
ARMY DESIGN BUREAU
Connecting Capabilities

Atma Nirbhar Bharat is not about being self-contained or being closed to the world. It is about being self-sustaining and self-generating.

Under the self-reliant India campaign, the country's goal is to make the nation the world's biggest military power on its own and develop a modern military industry here.

Prime Minister Narendra Modi





MESSAGES

राजनाथ सिंह
RAJNATH SINGH

सत्यमेव जयते

रक्षा मंत्री
भारत
DEFENCE MINISTER
INDIA

MESSAGE

I am pleased to know that the Seventh Edition of the Compendium of Problem Definition Statements 2025 of Indian Army is being released soon. The evolving dynamics of warfare demand not just strategic prowess but also technological superiority and adaptability.

Through this compendium, the Army Design Bureau of Indian Army has been acting as a catalyst that bridges our Armed Forces with India's scientific and technological community by inviting industries, startups, academia and R&D organisations to contribute in developing solutions that will augment the Indian Army's operational readiness. This endeavour aligns with the vision of Atmanirbhar Bharat, aiming to reduce dependency on foreign solutions and fortify our defence capabilities with home grown solutions. It also provides the right impetus to the 'Year of Reforms' by focusing on emerging technologies in domains like Artificial Intelligence, Cyber and Robotics by bringing together all stakeholders in the defence ecosystem.

I am told the response to previous compendiums were very heartening, having helped to address many critical requirements of the Army. Let us together strengthen India's defence for a secure and progressive India.

'Jai Hind'

New Delhi
31 January, 2025

(Rajnath Singh)

आज़ादी का अमृत महोत्सव

MESSAGE

1. The Indian Army is committed to modernisation & indigenising its capabilities to enhance its operational readiness & self-reliance for which a number of actionable steps are being undertaken. Compendium of Problem Definition Statements is one such step that focuses on fostering development of niche technologies by actively collaborating with the Industry and Academia.

2. The Industry and Academia have been most forthcoming in their response to Problem Definition Statement providing novel indigenous solutions. Army Design Bureau, in turn, has contributed effectively by monitoring and handholding various stakeholders of the defence ecosystem to help propel indigenous technological development endeavours. Seventh Edition of the Compendium of Problem Definition Statement is a comprehensive compilation of current technology driven challenges of the Indian Army. Each problem statement highlights a specific challenge faced by our soldiers, calling upon the collective intellect and innovative capabilities of our nation's industry, academia and research institutes.

3. We are sanguine that this document will become a useful reference point for initiating projects and synergizing efforts to achieve our common goal of indigenisation of defence equipment to realise the national vision of 'Atmanirbharta'.

Jai Hind!

(Anil Chauhan)
General
Chief of Defence Staff

MESSAGE

The evolving security dynamics globally has adequately highlighted the need for indigenous industrial and technological capabilities towards ensuring true strategic independence. The nature of modern warfare necessitates a robust and adaptive technological framework, and this compendium lays the groundwork for strengthening our nation's defence preparedness in technological domain.

The Compendium of Problem Definition Statement 2025 is not just a collection of challenges; it is an invitation to innovators, researchers, technologist and entrepreneurs across India to partner with the Indian Army in creating solutions that address real-world operational challenges.

The problem statements outlined in this compendium are derived from practical experiences and operational requirement, underlining the urgent need for innovative indigenous solutions that bridge the gap between current capabilities and future battlefield requirements. The Army Design Bureau's efforts in collating these problem statements from field formations are commendable, as it plays a crucial role in fostering collaboration between the Army and the broader defence ecosystem.

I urge all stakeholders to utilise this opportunity and become active participants in strengthening our defence capabilities. Your solution today will be the cornerstone of our security tomorrow, while together we will create a '*Sashakt Sena*' towards ensuring a *Surakshit* and *Atmanirbhar Bharat*, which are imperatives for a *Viksit Bharat*.

'Jai Hind'

(Upendra Dwivedi)
General
Chief of the Army Staff

राजेश कुमार सिंह, भा.प्र.से.
रक्षा सचिव
Rajesh Kumar Singh, IAS
Defence Secretary

सत्यमेव जयते

भारत सरकार
रक्षा विभाग
रक्षा मंत्रालय
Government of India
Department of Defence
Ministry of Defence

MESSAGE

The launch of the Seventh Edition of the Compendium of Problem Statements 2025 by the Indian Army is a significant milestone in our ongoing journey toward self-reliance in defence through relentless pursuit of excellence and technological advancement. This document highlights a series of operational challenges that the Indian Army faces, inviting bright minds across the nation to contribute innovative solutions that will reinforce our defence capabilities. The compendium is more than a collection of challenges; it is a strategic bridge between our Armed Forces and India's vast pool of technological talent.

Ministry of Defence takes great pride in supporting this forward thinking initiative, which embodies our commitment to nurturing an ecosystem that encourages the development of indigenous technology. The Indian defence industry and the academia have also stepped up to the call, while continuously finding innovative solutions for the requirements of Indian Army.

As this edition is launched, it is a timely reminder of India's growing strength in defence innovation and partnerships. I extend my deepest appreciation to the Indian Army for their visionary work and to all contributors who will play a role in shaping the future of our defence ecosystem.

'Jai Hind'

(Rajesh Kumar Singh)

संजीव कुमार
सचिव
Sanjeev Kumar
Secretary

सत्यमेव जयते

भारत सरकार
रक्षा मंत्रालय
रक्षा उत्पादन विभाग
Government of India
Ministry of Defence
Department of Defence Production

MESSAGE

Future battlefields will be shaped by technology and technological superiority will affect outcomes. Countries world over are increasingly adopting a 'Whole of Nation' approach to maximise resources potential available with them. It is thus essential that technological self-reliance remains the focus and our collective national effort is directed to achieve this.

The Seventh Edition of Compendium of Problem Statements 2025, prepared by the Army Design Bureau, represents the Indian Army's proactive approach towards continuous modernisation and technological evolution. This endeavour will provide an impetus to the 'Year of Reforms' aimed at transforming the Armed Forces into a technologically-advanced combat-ready force capable of multi-domain integrated operations. The Army's efforts have started to bear fruit in the form of not only enhanced and enthusiastic responses from the country's defence eco system but also a boom in indigenous defence manufacturing.

The Department of Defence Production takes immense pride in facilitating such collaborations, ensuring that our forces remain resilient and ready to counter emerging threats. I would encourage all research and development institutes and defence manufacturing industries in India to participate with vigour to offer solutions that would further our goal of 'Atmanirbhar Bharat' in defence sector.

Place: New Delhi

Sanjeev Kumar 30/01/2025
(Sanjeev Kumar)

Jyoti Vij
Director General

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CIN: U99999DL1956NPL002635
ISO 9001:2015 Certified

MESSAGE

Technology plays a crucial role in development of capabilities and systems to meet desired future operational efficiency of the Armed Forces. The compilation of the 'Problem Definition Statements 2025' by the Indian Army is a commendable effort to share its requirements with the Start-ups, Incubators, R&D Organisations, Academia and Industry for creating indigenous solutions. On behalf of the Indian Industry, I would like to compliment the Indian Army for continuing in this pursuit of innovation and indigenisation.

This booklet will immensely help the Indian industry to understand the future challenges that the Indian Army could face and also throw light on the requirements of technology in the near future. This will further facilitate forecasting and planning for the Indian industry. On behalf of FICCI, I would like to reaffirm our commitment to the initiatives of Ministry of Defence and the Indian Army. FICCI is actively working towards Hon'ble Prime Minister's vision of "Make in India" and firmly believes that India will march forward steadfast to achieve Atmanirbharta in Raksha Utpadan.

Jyoti Vij
Director General
FICCI

PREFACE

It is with great pride and a sense of duty that we present the seventh edition of the Compendium of Problem Definition Statements (CPDS) of the Indian Army, a flagship publication by the Army Design Bureau (ADB). The CPDS is a pivotal document that endeavors to bridge the gap between the operational challenges faced by the Army and the innovative solutions offered by academia, industry, start-ups and research institutions. Among the many dividends of this initiative, it has accelerated the pace of modernization through indigenisation, and created a platform for our brightest minds to contribute directly to national security. The previous Compendiums have already led to more than hundred schemes, which are at various stages of development or induction into Service. An update of the last edition, CPDS - 2023, is covered in subsequent pages.

The evolving nature of warfare, characterised by technological advancements, asymmetric threats and multi-domain operations, necessitates an agile and responsive approach to problem-solving. In its seventh edition, the compendium continues to encapsulate the dynamic challenges faced by the Indian Army across diverse operational, training, logistical and administrative fields, with a focus on fostering self-reliance in defence under the vision of *Atmanirbhar* Bharat.

I extend my deepest gratitude to everyone who have contributed to the identification and formulation of these problem statements. Their dedication ensures that this document remains a beacon for innovation in India's defence landscape.

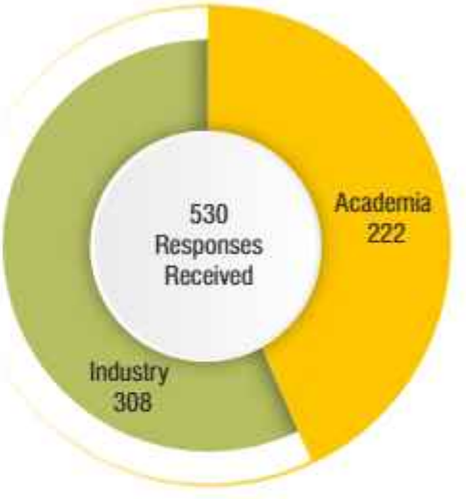
As we release this edition, I encourage all stakeholders to view these challenges as opportunities to contribute to the national security framework and to propel India towards greater technological sovereignty. Together, let us work to equip the Indian Army with cutting-edge capabilities to meet the demands of the future battlefield.

Jai Hind!

Maj Gen CS Mann
Additional Director General
Army Design Bureau

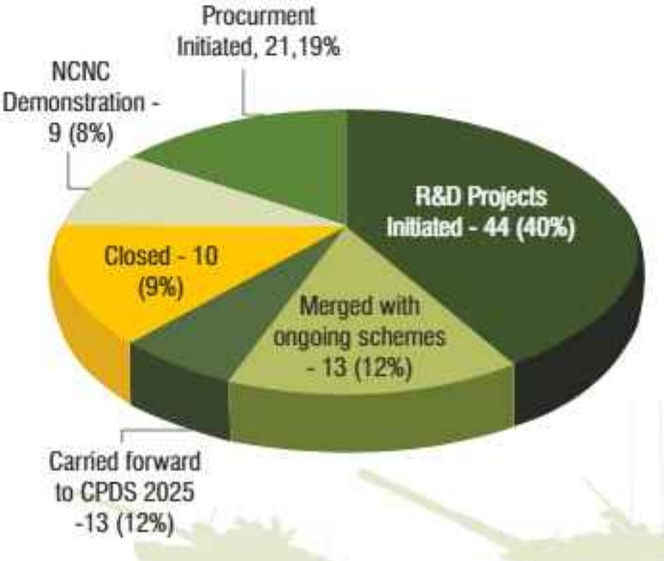
UPDATE ON THE STATUS OF COMPENDIUM OF PROBLEM DEFINITION STATEMENTS (CPDS) 2023

The Sixth edition of the Compendium of Problem Definition Statements (CPDS) was released on February 15 2023, during Aero India by Hon'ble Raksha Mantri Shri Rajnath Singh. CPDS 2023 comprised **110 Problem Statements (PS)** spanning across 20 technological/application domains. An overwhelming response was received, with **530 proposals** submitted by various stakeholders, underscoring the defence ecosystem's enthusiasm and commitment to addressing critical challenges. The problem statements drew notable interest, with some receiving as many as 17 to 18 solutions. This enthusiastic participation set the stage for a deliberate and rigorous evaluation process to identify the best-fit solutions that align with the requirements of each PS.



The final status of the Sixth edition is given below and the PS wise status is tabulated in the subsequent pages.

- 44 Research & Development/ Design & Development projects have been initiated to address specific problem statements.
- Nine Problem Statements received ready solutions which are being evaluated as No Cost No Commitment Demonstration for their effectiveness.
- 21 Problem Statements have been addressed under ongoing or planned procurement.
- 13 Problem Statements found their solutions integrated into ongoing projects, creating synergy with existing initiatives.
- 10 Problem Statements were closed due to resolution or alignment with other efforts.
- 13 Problem Statements have been carried forward for inclusion in CPDS 2025 & Compendium of Tech Challenge (CTC) 2025 to enable further exploration.



STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
	R&D Projects Initiated		
1	Data Mining Tool for Analysis	3	Project initiated under Army Technology Board (ATB)
2	AI Assisted Monitoring & Recognition of Targets/ Objects Detected by BFSR	4	Project initiated under ATB
3	AI Based Aircraft Recognition Package	5	Project initiated under ATB In house solution developed
4	Detection of Deep Fake & Propaganda Videos/ Images, Including Voice & Facial Manipulations Using AI	6	Project initiated under ATB
5	AI Based Automation framework for Handling Email / Grievances of Indian Army	8	Project initiated under ATB
6	AI Based News Aggregator Application Customised for Strategic & Geopolitical Significance	9	Project initiated under ATB
7	Digital Processing of Complaints Using Blockchain Technology	13	Project initiated under ATB
8	Robotic Gait Trainer with Exoskeleton for Patients with Spinal Cord Injury	16	Project initiated under ATB
9	Chip Based Integrated Encryption Module with Configurable Encryption Suites	18	Project initiated under ATB
10	Wireless Bluetooth Headgears for Tank Crew Having a Dual Communication Mode Compatible with Aerial Platforms	22	Project initiated under ATB
11	Forensic Analysis of Raw Drone Data	23	Project initiated under iDEX
12	Computational Algorithmic Framework for Artificial Intelligence (AI)/ Machine Learning (ML) Assisted Cryptanalysis	24	Project initiated under iDEX .
13	Website Defacement Detection & Mobile Application Scanner	25	Project initiated under iDEX
14	Graphic User Interface Based Social Media Monitor	27	Project initiated under iDEX
15	Automation of Data Management for Intelligence Surveillance & Reconnaissance	29	Project initiated under iDEX
16	Automatic Creation & Transmission of Surveillance Information from Medium Range Battle Field Surveillance Radar	30	Project initiated under iDEX
17	Video Search Including the Reverse Search Mechanism for Knowing the Originator- Source of Fake & Propaganda Videos on Social Media- Internet	31	Project initiated under ATB

STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
	R&D Projects Initiated		
18	Geographical Information System Based Data Management System	32	Project initiated under ATB
19	Automatic Extraction of Topographical Features from Satellite & Drone Images	34	Project initiated under ATB
20	Field Bio-Agent Detector	45	Project initiated under ATB
21	Avalanche Rescue Detector & Avalanche Rescue Reflector	49	Project initiated under ATB and iDEX
22	Active Adaptive Stealth for Armoured Fighting Vehicles	50	Project initiated under iDEX
23	Light Weight Armour for Armoured Fighting Vehicles	51	Project initiated under ATB
24	Heavy Payload Logistic Drones for High Altitude Areas	52	Project initiated under ATB
25	Integrated Passive Drone Detection System	54	Project initiated under ATB
26	Jet Based High Speed Kinetic Kill Drones	55	Project initiated under ATB
27	Decoders & Classifiers for Radio Frequency Spectrum Including Unmanned Aerial Systems	56	Project initiated under ATB
28	Light Weight 81 mm Infantry Mortar	61	Project initiated under iDEX
29	Electromagnetic Railgun for Long Range Weapon	63	Project initiated under ATB
30	Semi-Automatic Fire Control Systems for 155mm/ 45 Calibre SHARANG Gun System	65	Project initiated under IR&D
31	Uncooled Thermal Imaging Sensor	70	Project initiated under ATB
32	Fusion Technology for Night Imaging – Image Intensification & Thermal Imaging	71	Project initiated under iDEX
33	Ground Based Foliage Penetration Radar	72	Project initiated under iDEX
34	Rapid Unloading System for Armoured Vehicles	81	Project initiated under ATB
35	Outboard Motor (OBM) 30-50HP	83	Project initiated under ATB
36	Gasoline Engine Based Saw Chain	84	Project initiated under ATB
37	Automated Warehousing	89	Project initiated under ATB
38	Temperature Controlled Garage for Armoured Vehicles	92	Project initiated under iDEX
39	Replacement of 24V Secondary Batteries of Infantry Combat Vehicles (ICVs) Employed in High Altitude Areas (HAA)	93	Project initiated under ATB

STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
R&D Projects Initiated			
40	Mechanised Warfare Metaverse for Tactical Training	98	Project initiated under iDEX
41	Tactical & Technical Training Using Augmented Reality (AR)/ Virtual Reality (VR) & Haptics	99	Project initiated under iDEX
42	Augmented Reality (AR)/ Virtual Reality (VR) Based BMP-II Technical Training Simulator	100	Project initiated under iDEX
43	Two Way Rotary Conveyor (RC) Motor For Tanks (T-90/ T-72)	109	Project being initiated under Make I
44	Alignment Guide for Bone Resection in Knee Replacement Surgery	110	Project initiated under ATB
NCNC Demonstration			
45	Special Clothing & Mountaineering Equipment – Avalanche Victim Detector (AVD)	36	Equipment undergoing NCNC demo. PS closed
46	Special Clothing & Mountaineering Equipment – Boot Multipurpose	38	Equipment undergoing NCNC demo. PS closed
47	Special Clothing & Mountaineering Equipment – Karabiner 'P' Type	41	Equipment undergoing NCNC demo. PS closed
48	Special Clothing & Mountaineering Equipment – Tugger Shoes	44	Equipment under NCNC demo. PS closed
49	Sight for 30mm Cannon for Aerial Targets	68	Equipment under NCNC demo. PS closed
50	Puncture Proof Tyre System	77	Equipment under NCNC demo. PS closed
51	Portable Engine Driven Rock Drill	85	Equipment under NCNC demo. PS closed
52	Alternate Portable Power Generation System	94	Equipment under NCNC demo. PS closed
53	AI Based Augmented Reality (AR)/ Virtual Reality (VR) Tactical & Technical Training for Mechanised Forces	95	Solution selected for NCNC demo. PS closed
Procurement Initiated/ Completed			
54	Indigenous Secure Routers	17	Requirement being met through COTS equipment. PS closed
55	Indigenous Operating System for Mobile Phones	20	Problem addressed with development of Army Mobile System SAMBHAV. PS closed
56	Special Clothing & Mountaineering Equipment - Avalanche Air Bag	35	Product with improved technology being procured. PS closed
57	Special Clothing & Mountaineering Equipment – Boot Crampons	37	Procurement case initiated. PS closed

STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
Procurement Initiated/ Completed			
58	Special Clothing & Mountaineering Equipment – Ice Axe & Shovel	39	Procurement case initiated. PS closed
59	Hostile Fire Detection & Positioning System	47	Developed product being procured. PS closed
60	Cleaning of Bore of Barrel of 105/37 mm LFG/ 130 mm M-46/ 155mm Guns	60	New procurement case initiated. PS closed
61	Fire Control System & Automatic Target Tracker for Anti - Aircraft Machine Gun of Armoured Fighting Vehicles	64	Procured in Emergency Procurement (EP). PS closed
62	Night Enablement of ZU 23mm 2B Gun	69	Solution available commercially and under procurement. PS closed
63	Control Water Flow from Watershed	86	Solution available commercially and under utilisation. PS closed
64	Cargo Pallets for C-17 Aircrafts & Chinooks Helicopters	87	Solution available and under procurement. PS closed
65	Modular Portable Material Conveyor & Stacking System	88	Solution available commercially and under procurement. PS closed
66	Fumeless Kerosene Oil Heating Devices	91	Solution available commercially and under procurement. PS closed
67	Laser Based Tank Firing & Combat Simulation System	96	Merged with ongoing procurement case. PS closed
68	Control Station for Manoeuvre Range	97	Procurement initiated through OCPP route
69	Electronic Equipment of Smerch Weapon System	102	Procurement case initiated. PS closed
70	Night Sight for Schilka	104	Procurement case initiated. PS closed
71	Indigenisation of Assemblies of Tank T-90 Side Gear Boxes with Final Drive & Running Gear	105	Procurement case initiated. PS closed
72	Laying & Loading System of 155mm FH 77 B02 Bofors Gun System	106	Procurement case initiated. PS closed
73	Superstructure Assemblies of 130mm Field Gun M46	107	Procurement case initiated. PS closed
74	Barrels & Receiver Assemblies of ZU 23mm Twin Gun	108	Procurement case initiated. PS closed
Merged with Ongoing Projects/ Schemes & PS Closed			
75	AI Enabled Manned Unmanned Teaming between Tanks & Drones	1	Merged with ongoing R&D project
76	Blockchain Enabled Smart Contract Based Ammunition Management System	10	Solution found through alternate project

STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
Merged with Ongoing Projects/ Schemes & PS Closed			
77	Blockchain Network Technology in Supply Chain Management	14	Merged with ongoing IR&D project having similar scope
78	Development of Robotic Mules for Logistic Loads	15	Merged with ongoing project under ATB
79	Surveillance, Tactical Reconnaissance & Offensive on Move (STROM) Manned – Unmanned Teaming	28	Merged with ongoing MAKE-II project with revised scope
80	Mandarin Translator	33	Merged with ongoing TDF project with revised scope
81	Acclimatisation for High Altitude Deployment	48	Merged with ongoing DRDO project for holistic solution
82	Quadcopter Based Gamma Spectroscopy System	53	Merged with ongoing DRDO & BARC project
83	Integrated Digital Cockpit	73	Merged with ongoing iDEX project
84	Situational Awareness System for Mechanised Formations	74	Merged with ongoing iDEX project
85	Secure Vehicle Convoy Tracking & Information System	75	Merged with ongoing iDEX project
86	Explosive Based Minefield Breaching Technology forCreation of Safe Lane Through Minefield	80	Merged with ongoing Make II project
87	Virtual Reality Based Forward Observation Officer (FOO) Training System	101	In house solution developed
Problem Statement not Being Pursued			
88	AI Based Intrusion Detection & Target Acquisition System	2	No viable solution received
89	AI Based Integrated Surveillance, Detection & Alarm System	7	No viable solution received. Capability included in development of futuristic system
90	Blockchain Based Capital Procurement Process	11	No viable solution received
91	Blockchain Based Patch Management System (BPMS)	12	No viable solution received
92	End to End Encryption Solution	19	No viable solution received
93	Life Extension Methodology for 84mm Rocket Launcher Mk-III	62	Solution not meeting user requirement
94	Light Weight Passive Targeting & Fire Support System	67	Capability being achieved by upgrading of present system
95	Advance Driver Assistance System for Armoured Fighting Vehicles	76	The solution is not relevant any more due to the up gradation of driver night sight

STATUS UPDATE OF CPDS 2023

Ser No	Problem Statement	PDS No	Status
Problem Statement not Being Pursued			
96	Rubberised Tracks for Armoured Fighting Vehicles (AFVs)	78	No viable solution received
97	Replacement of Faulty Artillery Thermal Imaging Module Long Range	103	Capability being achieved by upgrading of present system
Live/ Carried Forward to CPDS 2025			
98	Quantum Assured Positioning, Navigation & Time (PNT) to Overcome Vulnerabilities	21	No viable solution received. PS reviewed and included as three new Problem Definition Statement No 36,37 & 38
99	Electronics Accessories Scanner	26	No viable solutions received and included as new Problem Definition Statement No 13
100	Special Clothing & Mountaineering Equipment – Jacket Down Trouser Down (JDTD)	40	No viable solutions received and included as new Problem Definition Statement No 80
101	Special Clothing & Mountaineering Equipment – Modular Gloves	42	No viable solutions received and included as new Problem Definition Statement No 81
102	Special Clothing & Mountaineering Equipment – Rock Piton	43	No viable solutions received and included as new Problem Definition Statement No 82
103	120mm/ 105mm Mortar for Carrier Motor Tracked	57	No viable solutions received and included as new Problem Definition Statement No 43
104	4th/ 5th Generation Anti-Tank Guided Missile	58	No viable solutions received and included as new Problem Definition Statement No 44
105	Development of Fragmentation Rounds for Secondary Armament	59	No viable solutions received and included as new Problem Definition Statement No 41
106	Fire Control System for Sniper Rifle	66	No viable solutions received and included as new Problem Definition Statement No 52
107	Chemical Soil Stabilisation	79	No viable solutions received and included as new Problem Definition Statement No 60
108	Anti-Freeze Solutions for Water at High Altitude Areas	90	No viable solutions received and included as new Problem Definition Statement No 59
Carried Forward to Compendium of Tech Challenges (CTC) 2025			
109	Alternatives to Halon Gas Used in Fire Fighting System in the Armoured Fighting Vehicles	46	No viable solutions received and included as Technological Challenge in Compendium of Tech Challenges (CTC) 2025
110	Fuel Quantity Measuring & Quality Control Device	82	No viable solutions received included as Technological Challenge in Compendium of Tech Challenges (CTC) 2025

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GUIDELINES FOR RESPONDING TO COMPENDIUM OF PROBLEM DEFINITION STATEMENTS 2025

GUIDELINES FOR RESPONDING TO COMPENDIUM OF PROBLEM DEFINITION STATEMENTS 2025

Introduction

1. Army Design Bureau (ADB) was established to promote innovation and self-reliance in defence capabilities. It functions as the interface between the Indian Army and the broader innovation ecosystem, encouraging a collaborative approach to problem-solving. The compendium outlines problem statements derived from real-world operational and functional challenges faced by the Indian Army. It serves as a formal invitation to stakeholders to contribute ideas, technologies and solutions that meet the Indian Army's requirements.

Scope and Layout

2. CPDS 2025 consists of **82 Problem Statement** across **11 functional domains** of warfare, ranging from armament, unmanned systems to requirements in the field of artificial intelligence, cyber and logistical challenges. All Problem Definition Statement (PDS) are **uniformly structured** starting with a **brief description** of the problem to help understand the genesis and its importance. Wherever applicable, a mention of current proven equipment available in the world is given to indicate the kind of indigenous solutions that may be evolved. Most importantly the **deliverables**, clearly spell out the solution expected for the PDS from the respondents. In order to solicit novel solutions and allow maximum latitude in creativity while approaching a problem, a PDS has broader scope than traditional Request for Proposal.

Eligibility

3. Responses are invited from entities that meet the following criteria:-

- **Academic Institutions:** Universities, colleges and research centres engaged in R&D and technological innovation.
- **Industry:** Start-ups, MSMEs and established defence companies registered in India.
- **Research Organisations:** Government and private R&D establishments working on advanced technologies.

Procedure for Response

4. To submit a proposal in response to the CPDS it is suggested to review the complete compendium and select the problem(s) most aligned with expertise and capabilities of the proposer. The following guidelines may be adhered to while submitting the proposals:-

(a) Depending on the problem, the solutions offered may be ranging from Technology Readiness Level **(TRL) 3 to 7**, i.e. from established proof of concept to developed prototype, and will be accordingly evaluated during selection.

(b) The proposers should prepare a comprehensive solution in the **prescribed format** given at **Appendix A** and submit it within the **specified timeline** mentioned in the ADB link on Indian Army website (indianarmy.nic.in).

(c) The proposals should have well defined objectives, scope, outcomes and quantifiable deliverables with specific time lines. Any **additional relevant details** other than those given in the format may be included in the proposal.

(d) The proposals will be **submitted in the email id** of both, the primary (cpds.proposal@gov.in) and secondary contact given in the respective PDS, while mentioning the associated PDS number in the subject (Subject : Proposal for PDS No ___ for CPDS 2025).

5. Proposals submitted should be **unclassified** in nature and should include an **undertaking to allow ADB to share** it with technical experts outside the organisation, for the purpose of evaluation, only if required. ADB treats all submissions as confidential information, discloses their contents only for the purpose of evaluation. For this purpose, all tech institutions and individuals associated with ADB in advisory capacity are obligated by appropriate **Non-Disclosure Agreement**.

Selection and Assessment Criteria

6. Proposals will be initially screened and considered by Domain Specialists in the Indian Army and in some cases by nominated technical experts from the Department of Science and Technology for their suitability. The shortlisted proposals will be considered by an expert panel of High-Powered Selection Committee against assessment criteria listed in the next paragraph. The selection process flow of proposals of CPDS is enunciated in **Appendix B**. Proposers will be informed of the outcome at every stage through email as soon as possible after the screenings. Proposers should be prepared to present their proposals to the experts or the Committee on video conference call when required. If required, the proposer should also be prepared to show their facilities on ground to a nominated team of experts for validations of the claimed capability.

7. As such the nature of the challenge and the scientific quality of the proposal are critical, as well as the suitability of the proposal to the requirement. Proposals will be evaluated based on the following criteria:-

- **Relevance:** Alignment with the problem statement and operational requirements.
- **Innovation:** Novelty of the solution and use of advanced technologies.
- **Feasibility:** Practicality and ease of implementation in the Indian Army's environment.
- **Scalability:** Potential to scale the solution for widespread adoption/ bulk production.
- **Cost-Effectiveness:** Budget viability without compromising performance or quality.
- **Development Timeline:** Realistic and achievable timelines for deployment.
- **Indigenous Content:** Preference will be given to solutions that maximise indigenisation.

Appendix A

(In reference to paragraph 4 of Guidelines for Responding CPDS 2025)

RESPONSE FORMAT FOR CPDS PROPOSAL

1. PDS number and title of PS for which the solution is offered. . . . . .
2. Name of proposal. . . . . .
3. Solution proposed by (Name of Firm/ Institution).
4. Contact details:-

   Name - . . . . . .

   Phone - . . . . . .

   Email - . . . . . .
5. Whether Govt/ Private entity?
6. Proposed solution:-

   ☐ Already developed.

   ☐ Partially developed.

   ☐ Not developed, in concept stage.

   ☐ Being evaluated.
7. In case funding is required, amount required?
8. In case the proposal is in concept stage, time required for prototype development?
9. Scope of project (in case of development projects).
10. Brief description (not more than 200 words).
11. Details of experience / R&D in similar project for any government or private organization (If yes, provide the technical details and status of the project)
12. Details of previous experience/ projects undertaken/ under progress individually or in collaboration, if any.
13. Foreign collaboration, if any.
14. Percentage of indigenous content in development of the project at sub component level.
15. Core business of the vendor (not applicable for academic institutions).
16. Company/ Firm valuation as on date (if applicable).
17. MSME/ Startup registration (if applicable).

18. Research and development facility available.

19. Manufacturing base/ facility available or not? (if applicable)

20. Concurrence for visit by Indian Army team of experts to inspect the facilities on ground.

21. Assistance required from Indian Army, in terms of - requirement of firing ranges/ service equipment, ammunition, etc/ visit to forward areas for operational perspective/ internal evaluations or any other specific requirement.

22. Any IP held with reference to this project or any other project. Enclose the details.

23. Enclose supporting documents, such as patents, technical drawings.

24. No IP infringement certificate (Self Certificate) required to be enclosed. Format is as under:-

"I/We hereby certify that Project proposal being offered is original and will not amount to infringement of IP".

25. Undertaking for non duplicity of similar project with other government agency. Format is as under:-

"I/We hereby certify that similar project has not been undertaken/ planned with any other government agency for which funding has been applied for/released".

FORMAT FOR DETAILED PROJECT PROPOSAL

NAME OF PROJECT

Principal Investigator 1 : --

Principal Investigator 2: --

Problem Statement

To design -- subsystem, that

1. --
2. --
3. --

Existing Technology

Technology to be Developed

------- ------------------------------- **System Architecture:** We propose to

------- --

------- --

------- --

------- --

--response.

Fig 1: Proposed Architecture

-- --------- Subsys Architecture:

Figure 2 shows the proposed architecture. ---------------- ---------------------

-- ---------------------

-- ---------------------

-- ---------------------

-- ---------------------

Fig 2: Proposed Architecture

Development Plan: Proposed roadmap and timelines with key milestones. -

- -

Indigenous Content: Provide details of non-indigenous sub systems and components used in development

- -

Milestone 1

Actions:

1. -
2. -
3. -
4. -

Deliverables:

1. -
2. -
3. -

Budget

Budget Head	Month1	Month 6	Month 12	Justification
Consumable	Amount	Amount	Amount	
Manpower	Amount	Amount	Amount	
Contingency	Amount	Amount	Amount	
Travel	Amount	Amount	Amount	
Equipment	Amount	Amount	Amount	
Total W/o overhead	Amount	Amount	Amount	
Overhead	Amount	Amount	Amount	
Total with overhead	Amount	Amount	Amount	
	Amount	Amount	Amount	
Total	Amount			

Milestone 2

Actions:

1. ----------
2. ----------
3. ----------
4. ----------

Deliverables:

1. ----------
2. ----------
3. ----------

Budget

Budget Head	Month	Month	Month	Justification
Consumable	Amount	Amount	Amount	
Manpower	Amount	Amount	Amount	
Contingency	Amount	Amount	Amount	
Travel	Amount	Amount	Amount	
Equipment	Amount	Amount	Amount	
Total W/o overhead	Amount	Amount	Amount	
Overhead	Amount	Amount	Amount	
Total with overhead	Amount	Amount	Amount	
	Amount	Amount	Amount	
Total	Amount			

Total Amount in ---------- Mile stones

Final Deliverable

An system, that

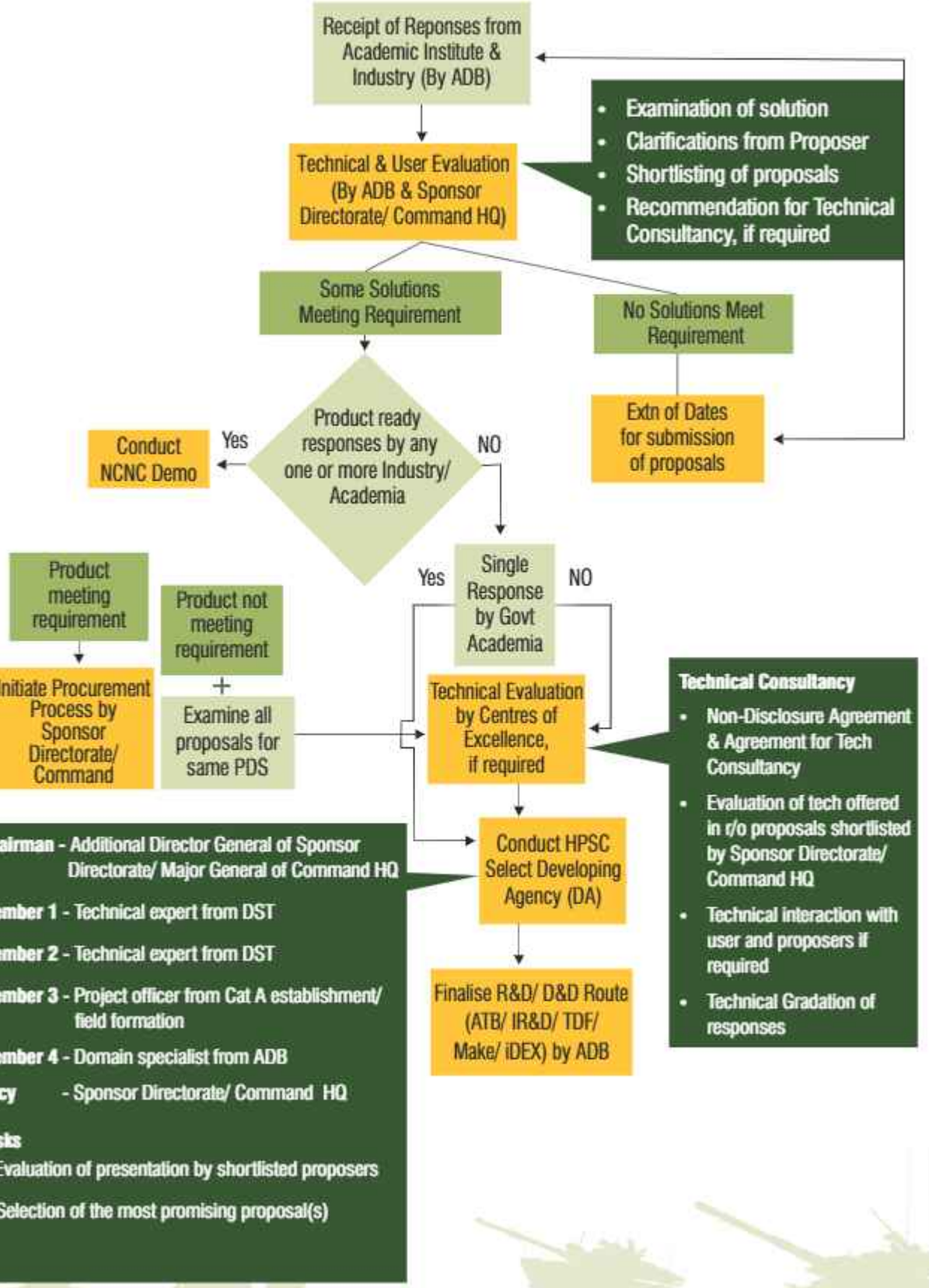
1. ----------
2. ----------
3. ----------
4. ----------

Schedule of Fund Transfer and Associated Checkpoints	Fund Release for	Activity needs to be completed
	Number of months	Initial Study Report
	Number of months	Milestone 1
	Number of months	Milestone 2
	Number of months	Complete Deliverable

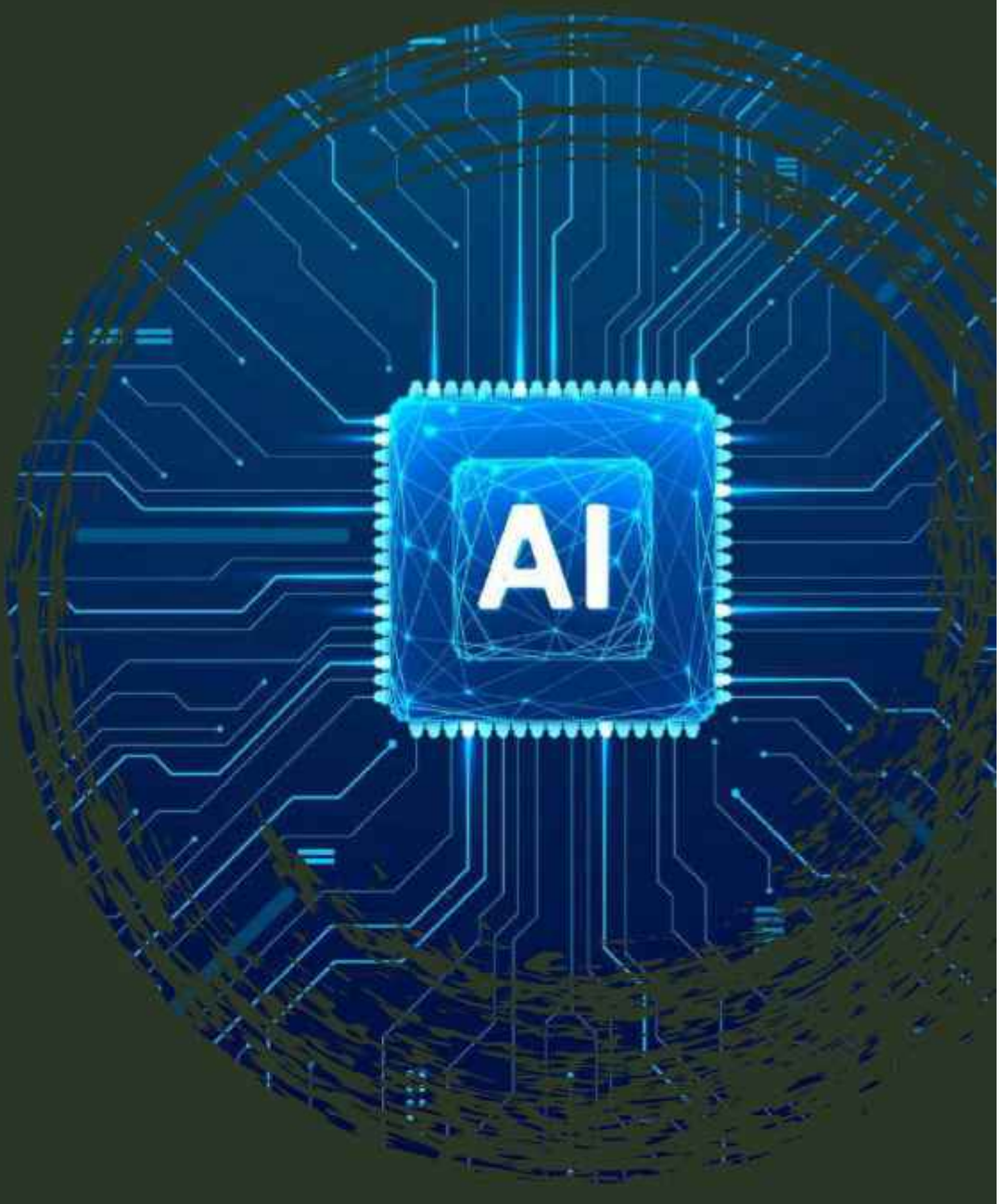
Appendix B

(In reference to paragraph 6 of Guidelines for CPDS 2025)

SELECTION PROCESS OF PROPOSED SOLUTIONS TO CPDS




Ai



ARTIFICIAL INTELLIGENCE (AI)

PROBLEM DEFINITION STATEMENT – 1

AI BASED AUTOMATED TARGET DETECTION FOR AFVs

1. What is the Problem (Need)?

Today's battlefield has become increasingly complex and swift with plethora of weapon systems including those in the third dimension, wherein, Armoured Fighting Vehicles (AFVs) can be engaged at varied ranges. The vulnerability requires a need for modular AI based automated detection system which can be incorporated on current AFV to enable faster detection of targets for engagement.

2. Why it is Important to Solve?

Over the years, there has been acquisition of superior capabilities by our adversaries for engagement of AFVs. Hence, there is a need for acquiring latest technology for our AFVs to detect threats based on AI based automated model. The system will shorten decision making loop and facilitate faster target engagement.

3. Contemporary Solutions by Other Countries/ Organisations.

Various countries like USA, Russia and Israel are manufacturing tanks with AI enabled target detection system.

4. Deliverables.

AI Based Automated Target Detection System integrated with sensors of current fleet of Armoured Fighting Vehicles (T-72 and T-90).

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Secondary Contact.
Directorate General of Armoured Corps — Email : xecoord-2020.nic.mil

PROBLEM DEFINITION STATEMENT – 2

COLLATING AND ANALYSING MULTITUDE OF DATA IN CRITICAL CARE AREAS

1. What is the Problem (Need)?

Rapidly evolving smart AI algorithms to collate multitude of medical data is a felt need for analysis & streamlining Standard Operating Procedures (SOPs) and promoting Critical Treatment Decisions (CTDs) for the benefit of patients. Huge amount of medical data is available in critical care areas of Military Hospitals viz Intensive Care Unit (ICU), Operation Theater (OT), Labour Room, Neonatal Intensive Care Unit (NICU) etc. Manual search and analysis of this data is a cumbersome and time consuming exercise. Hence, developing a customised indigenous AI based solution to aggregate this data at a single platform to gain meaningful information is an essential requirement.

2. Why it is Important to Solve?

(a) Manual collation and analysis of the multitude of data is time consuming with poor efficacy.

(b) A customized AI based application for analysing the medical data available in CTDs of the Military Hospitals is the need of the hour in order to improve insight and understanding about the availability of medical data.

3. Contemporary Solutions by Other Countries/Organisations.

Not Known.

4. Deliverables.

A customised indigenous AI based software solution to aggregate critical care data from multitude equipment into a single platform/ dashboard to enable/ facilitate critical interventions.

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Secondary Contact.
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PROBLEM DEFINITION STATEMENT – 3

AI BASED TRANSPORT AND ROAD SPACE MANAGEMENT SYSTEM

1. What is the Problem (Need)?

Large number of vehicular movements are planned by Army units and formations on a daily basis for movement of stores and personnel. There is a scope for improving the efficiency of this planning, so as to reduce the number of vehicles that undertake the movement. Moreover, many convoys tend to get delayed due to usage of these roads by multiple military convoys as also civil traffic. There is a scope for planning this movement of large convoys to ensure that personnel and goods reach the location in time by according priority in movement of various types of convoys. Road space management becomes an important aspect during operations. There is also a requirement to improve the efficiency with which the existing transport fleet is utilized for movement of personnel and goods on a daily basis using AI based solution.

2. Why it is Important to Solve?

AI based module for management of transport echelons and road space management will help prioritizing movement of personnel, equipment and commodities both during peace and operations based on operational requirements, thus improving efficiency of the vehicular fleet.

3. Contemporary Solution by other Countries / Organisations.

Not Known.

4. Deliverables.

AI module should be able to undertake load and volume management, to include sharing of vehicles between entities, prioritization of load, plan movement of convoys to optimally utilize vehicles, routes, halts and road space, dynamic planning and intimation to concerned entities en-route. The following are the key deliverables desired:-

(a) Collate information and provide visibility of transport assets along with requisitioned civil transport assets in the area of responsibility.

(b) Optimally utilize movement of vehicles based on the origin station, destination, route and the load. Facilitate matching load carriage (bulk, weight & volume) to best available mode of transport. Consolidate requirement of a formation and recommend the number of vehicles required to move.

(c) Dynamic road space management in mountains and plains based on the nature of the road.

(d) Interface real-time/near real-time data of civil vehicles using the road from various open source platforms and Traffic Check Posts (TCPs) of Army.

(e) Provide recommendations with respect to routing/ re-routing of traffic based on the state of the road.

(f) Provide recommendation for best available route, VTKM (Vehicles to a Kilometre), inter se distance between vehicles as inputs for preparation of a convoy movement instructions.

(g) Based on the recommended route of movement and the updates from various TCPs, give out the tentative time of crossing of the subsequent TCPs. Suggest a tentative layout of the convoy for incorporating in the movement instructions.

(h) Intimate the receiving station of the tentative requirement of FOL for the night stay/ return journey.

(j) Prioritisation of convoys/vehicles based on load, troops, supplies, FOL etc.

(k) Post mapping of Transit Camps (TCs), AI module should be able to plan the halts en-route and generate required intimation drafts to the required entities with respect to number of vehicles, personnel and equipment required to be accommodated along with duration and type of support required.

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PROBLEM DEFINITION STATEMENT – 4

AI BASED SUPPLY CHAIN MAPPING SYSTEM

1. What is the Problem (Need)?

Recent wars and the pandemic have shown that disruption of supply chains can hamper the availability of equipment, components and sub-components, thus affecting the readiness levels. Indian Army buys a large number of items to include equipment and complex spares which have multiple components. These equipment and their spares have multiple vendors in the supply chain. Therefore, the surge capability for production of either of these during a state of heightened conflict will be dependent on the capability of the least denominator amongst the suppliers. Thus, it is important that the multi-tier supply chain is highlighted to identify the vulnerability as well as predict the likelihood of disruption.

2. Why it is Important to Solve?

Mapping of multi-tiered supply chain will assist in identifying the linkages that are likely to disrupt supply of components during critical periods.

3. Contemporary Solution by Other Countries / Organisations.

Not Known.

4. Deliverables.

AI module should be able to map the multi-tiered supply chain along with the ownership of each entity, prompt/highlight vulnerabilities as defined by user/developer and recommend alternate suppliers for selected entities. The following are the key deliverables desired:-

(a) Use open source information such as financial transaction record details to map the second, third and fourth tier suppliers of components, sub-components for major weapon systems/ equipment being procured/already procured by Army.

(b) Sense the risks across the supply chain based on the identification of ownership up to 1% holdings, to include the Board of Directors, State Owned Enterprises and country of origin.

(c) Suggest alternate suppliers of the components & sub-components based on the function and role.

(d) Algorithm should be able to furnish data as desired above with effect from a mutually agreed time stamp.

(e) Software/algorithm developed should be able to work on a standalone mode, updated in offline mode and be upgradable with latest updates from the developer.

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Secondary Contact.
Directorate General of Operational Logistics — Email : ialogisticseminar@gmail.com

PROBLEM DEFINITION STATEMENT – 5

AI BASED PREVENTIVE MAINTENANCE OF EQUIPMENT AND DEMAND FORECAST OF SPARES

1. What is the Problem (Need)?

Present system of intervention for repairs are either based on fixed time intervals or on occurrence of defect. On a numerous occasions, down time of equipment is prolonged for want of spares in the concerned echelon of repair. This makes mission reliability of equipment a suspect. The aspect of preventive maintenance of the equipment when linked with Ordnance echelon responsible for provisioning of spares can forecast its requirement. It will help in stocking spares in time to improve the mission reliability of equipment, prevent over stocking & creation of dead stocks. There is a requirement to undertake predictive analysis of the equipment and proactively intervene with maintenance activities based on its performance, thus improving mission reliability.

2. Why it is Important to Solve?

(a) Generation of AI based analysis for predictive maintenance will assist in achieving desired mission reliability.

(b) Quantify mission reliability in following terms:-

(i) Comprehensive rating of equipment.

(ii) Residual life of equipment under peace & operational condition.

(iii) Forecast likely intervention required in operations.

(iv) Predicted options for best possible exploitation for particular equipment.

(v) Optimised inventory levels to be planned to support the equipment.

3. Contemporary Solution by other Countries / Organisations.

Being used in new generation vehicles individually, but not for demand forecast of spares.

4. Deliverables.

The key deliverables desired are from AI based Preventive Maintenance Module of Equipment and Demand Forecast of Spares, are as under:-

(a) Identify and prepare the database required, to be able to undertake integration of an AI based Preventive Maintenance Module for the Army.

(b) Collect and collate information with respect to the key parameters on vehicle/equipment reliability (to include vintage, mileage, engine hours, operational hours, state of equipment (Original/Overhauled), last Repair/ Overhaul etc) at various workshops in formations to be able to prepare the database.

(c) Establish a pattern with respect to data point ingestion and accuracy of output for various types of vehicles.

(d) Format for data collection and method to implement AI based model with the existing fleet of vehicles and the sensors required in future induction of vehicles.

(e) Correlate key parameters of the equipment with its vintage, specified life, demonstrated performance, terrain of exploitation, prevalent weather conditions to include temperature, humidity, wind pattern etc and the Key Performance Indicators (KPI). AI module should be able to generate trigger for checking/replacement of assemblies/sub-assemblies as per terrain specific exploitation.

(f) Identify pattern in breakdowns & spares utilised to revive the equipment.

(g) Analyse & present spares requirement along with periodicity.

(h) Analysis of system/sub system wise intervention and requirement of spares accordingly.

(j) Holistic view of vehicles/equipment undergoing maintenance/ requiring maintenance/ delay in maintenance for quick assessment.

(k) Overview of spares released/in transit/not materialised as per pattern of vehicle/equipment behaviour.

(l) For example, using data regarding mileage, environment parameters where asset is being used, ambient temperature, vehicle history of repairs, normal pattern etc., DA can prepare predictive maintenance for cooling systems of Lorry Ashok Leyland Stallion (ALS). Such models will have to be created independently for various types of vehicles and equipment in service.

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PROBLEM DEFINITION STATEMENT – 6

AI SEARCH ENGINE FOR EMPLOYMENT OPPORTUNITIES OF EX SERVICEMEN

1. What is the Problem (Need)?

There are a vast number of vacancies available for Ex Servicemen on the Internet which are being searched manually. This is due to rapid increase in use of Internet and online posting of vacancy by companies. Developing an AI based solution to search for relevant vacancy is an essential requirement. Also, JCOs and Other Ranks find it difficult to create CVs based on the Job Description and hence an AI generated CV from the existing data base available on the website of Army Welfare Placement Organisation will be beneficial.

2. Why it is Important to Solve?

Many AI based applications are available for job search but they are not customized to search jobs for Ex Servicemen. Manual search of vacancy is time consuming and chances of missing out on good vacancies are high.

3. Contemporary Solutions by Other Countries/ Organisations.

Not applicable.

4. Deliverables.

The key desired deliverables are as under:-

(a) AI based aggregator application to search for jobs on the Internet specifically for Ex Servicemen.

(b) AI based application to generate CVs for Ex Servicemen.

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PROBLEM DEFINITION STATEMENT – 7

AI BASED NETWORK VULNERABILITY ASSESSMENT TOOL

1. What is the Problem (Need)?

Interlinking of various IT assets has created a complex intertwined network in which cyber vulnerabilities can be exploited by adversaries. With proliferation of Machine Language and Artificial Intelligence, possibility of exploitation of vulnerabilities in cyber domain has increased manifold. There is a requirement to safeguard own network as well as assets including servers, peripherals & devices in dynamic and distributed cyber environment.

2. Why it is Important to Solve?

Early detection of cyber vulnerabilities will assist in negating the cyber compromise to a large extent. Further, enabling segregation of compromised devices and replacing them in near real time is vital to solve the problem.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

Indigenous tool must be able to monitor cloud as well as web-based applications deployed on a captive network (not connected to internet). It should also include the following: -

(a) Pre-scan module, which can accurately finger print a host.

(b) Identify the vulnerabilities and take remedial measures before they are exploited by threat actors.

(c) Scanning with Six Sigma Accuracy.

(d) Vulnerability patching and domain isolation, thus managing threat in real time.

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CYBER/ SOFTWARE/ AUTOMATION

PROBLEM DEFINITION STATEMENT – 8

POST QUANTUM CRYPTOGRAPHY (PQC) BASED WEB BROWSER

1. What is the Problem (Need)?

Web browsers are crucial components of digital infrastructure, facilitating secure communication between users and websites. Advanced cyber security threats pose a significant risk to the security of data transmitted over the Army network. Current web browsers rely on conventional protocols which are susceptible to cyber-attacks / malfunctioning. This vulnerability could lead to the exposure of sensitive data, undermining the privacy and security of users. Ensuring that browsers are equipped with PQC algorithms helps safeguarding sensitive transactions, personal information and critical data against potential quantum enabled threats. There is a need to develop and deploy web browsers that leverage Post Quantum Cryptography (PQC) to provide robust security against quantum computational threats.

2. Why it is Important to Solve?

Implementation of PQC in web browsers will mark a significant advancement in securing digital communications for the Armed Forces.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

Indigenous PQC based web browser for Army Data Network which ensures confidentiality, integrity and authenticity of the web communications against future cyber threats.

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PROBLEM DEFINITION STATEMENT – 9

SOFTWARE DATA DIODE TO INTEGRATE TWO TRUSTED NETWORKS

1. What is the Problem (Need)?

Currently, Network A and Network B of Indian Army are not able to seamlessly communicate with each other. The integration of Network A and Network B side poses significant challenges due to the need for secure data transfer between both the networks. Army seeks to develop seamless integration of two trusted networks i.e. Network A and Network B to enable secure and efficient data transfer using the Software Data Diode solution without causing disruptions to existing operations to facilitate seamless integration while maintaining data integrity and confidentiality.

2. Why it is Important to Solve?

(a) **Operational Efficiency.** Integrating these networks will streamline communication and data sharing processes, enhancing the efficiency of military operations. It will allow faster dissemination of critical information, facilitating real-time decision-making and coordination among military units and command structures.

(b) **Resource Optimization.** Combining resources and infrastructure from both networks can lead to cost savings and improved resource utilisation.

(c) **Enhanced Situational Awareness.** By integrating data from various sources and sensors across both networks, military commanders gain a comprehensive view of the operational environment, leading to improved situational awareness and better-informed decision-making. This includes real-time Intelligence, Surveillance and Reconnaissance (ISR) data, as well as logistical and operational information.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

Four prototypes of indigenous Software Data Diodes for seamless integration of two trusted networks i.e. Network A and Network B.

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PROBLEM DEFINITION STATEMENT – 10

DYNAMIC ATTACK ADAPTATION

1. What is the Problem (Need)?

Machine Language Algorithms can target the traditional protection system by compromising firewalls, routers, switches as well as kernel of the Operating System itself. These algorithms have aggravated the persistent threat against the cyber security of the Armed Forces. The situation is aggravated further by autonomous adjustment of the attack vectors and execution of auto responses.

2. Why it is Important to Solve?

Early detection and self-learning algorithms will assist in wresting initiative from the adversary. This will result in near real time response generated by autonomous attack adaptation, thus ensuring cyber security.

3. Contemporary Solutions by Other Countries/ Organisations.

'Cortex XDR' platform used by US.

4. Deliverables.

Implementation of solution (both software and hardware) that detects, responds and is fully integrated on Endpoints, Network as well as the Cloud Data. The system should have ability to detect problems on the network and adapt to neutralize the threats. It should also include the following:-

(a) Reveal root cause to speed up investigation.

(b) Validation of alerts in seconds.

(c) Reduce Mean Time to Identify (MTTI).

(d) Reduction of false positive alerts.

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PROBLEM DEFINITION STATEMENT – 11

AR/VR BASED TELEPHONIC CONSULTATION

1. What is the Problem (Need)?

At present Services e-Health Assistance and Tele-Consultation (SeHAT) and ISRO Telemedicine nodes are being used in Army for telephonic consultation in which physical examination of patients is not possible. Such a modality for telephonic consultation is unsafe for clinical approach in acute cases and emergencies. Hence, there is an urgent requirement of AR/VR technology in telephonic health services for improving diagnosis and quality of healthcare in Indian Army.

2. Why it is Important to Solve?

AR/VR technology in telephonic health services can be a revolution in improving quality of healthcare in Indian Army. These techniques can transform patient experience by creating immersive environment that helps in psychological therapy and during examination/ surgery.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

Highly immersive and transformative AR/VR headsets for creating a virtual environment combining it with reality for tele-consultation in Army.

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PROBLEM DEFINITION STATEMENT – 12

VIDEO COMPRESSION TECHNOLOGY

1. What is the Problem (Need)?

High-quality video transmission over narrowband VHF/UHF channels requires significant compression, which can lead to trade-offs in resolution, frame rate or colour depth. Transmitting video/HD images over half-duplex VHF (30-300 MHz) and UHF (300-3000 MHz) is challenging due to very limited data rates. Video compression techniques for half-duplex systems must minimize latency to ensure real-time transmission. Video streams, particularly in military or emergency communication, may require encryption to ensure secure transmission. Research into lightweight encryption algorithms that can be integrated into video compression without adding significant overhead is crucial.

2. Why it is Important to Solve?

Video compression techniques for half-duplex VHF/UHF bands will ensure utilization of Radio Sets for transmitting real-time battlefield video feeds or images.

3. Contemporary Solutions by Other Countries/ Organisations.

Research on highly efficient video codecs (coders decoders) like AV1 VP9 or optimized versions of H.265 (HEVC), specifically tailored for ultra-low-bandwidth environments like VHF/UHF bands. These codecs use advanced compression techniques such as spatial-temporal redundancy removal and entropy coding.

4. Deliverables.

Technology is required to be developed which enables compressing HD video to fit into VHF and UHF bands of radio communication (narrow bandwidth, typically between 25 kHz and 300 kHz) in half-duplex systems with encryption algorithms, without degrading video quality.

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CYBER/ SOFTWARE/ AUTOMATION

PROBLEM DEFINITION STATEMENT – 13

ELECTRONIC ACCESSORIES SCANNER

1. What is the Problem (Need)?

A large number of electronic accessories are procured through GeM & various other places for routine office work, carrying out technical work & other specific purposes. Support to carry out software (if accessory is executing any malicious communication or unwarranted program execution) & hardware (presence of any unwarranted component) testing for electronic accessories is very limited. The envisaged solution should be capable to provide support at hardware & software level and scan any form of malicious content.

2. Why it is Important to Solve?

Electronic accessories including wearable, chargers, adapters, keyboards, mouse, printers & various other accessories are becoming more intelligent and interconnected. They can inadvertently act as entry points for cyber-attacks. With the increasing digital threat globally and latest incidents like Pager attack, Stuxnet & various other cyber-attack vectors like key loggers, juice-jacking etc, it is imperative to carry out the testing of accessories & secure them before connecting to primary systems. Counterfeit or tampered accessories are a growing problem. This scanner will help in identifying unverified accessories that may introduce vulnerabilities.

3. Contemporary Solutions by Other Countries/ Organisations.

Few tools like Cycognito by Israel, Tenable in USA, Qualys etc are having partial features as required in this scanner.

4. Deliverables.

A robust Electronic Accessories Scanner (including wearable, chargers, adapters, keyboards, mouse, printers & various other accessories) that aligns with cyber security frameworks and regulations, increasing device security and ensuring compliance with legal standards. The deliverables are as under:-

(a) A functional scanner prototype capable of detecting malicious signals, vulnerabilities or unauthorized communication in electronic accessories.

(b) A scanning application with a user friendly interface to analyse connected accessories & display threat detection result, along with editable report containing details of vulnerability, risk levels & recommendation for mitigation.

(c) AI-powered algorithm for real-time threat detection and anomaly reporting including zero-day vulnerabilities.

(d) Comprehensive & continuously updated cyber threat signature library to identify known vulnerabilities.

(e) Industry level encryption protocols and secure communication method for detected devices which are compatible with cyber security framework like ISO 27001, GDPR etc.

(f) Identification of counterfeit or tampered accessories.

(g) User manuals and guidelines for deployment & operation of scanner.

(h) Training material along with workshops for better understanding of scanner.

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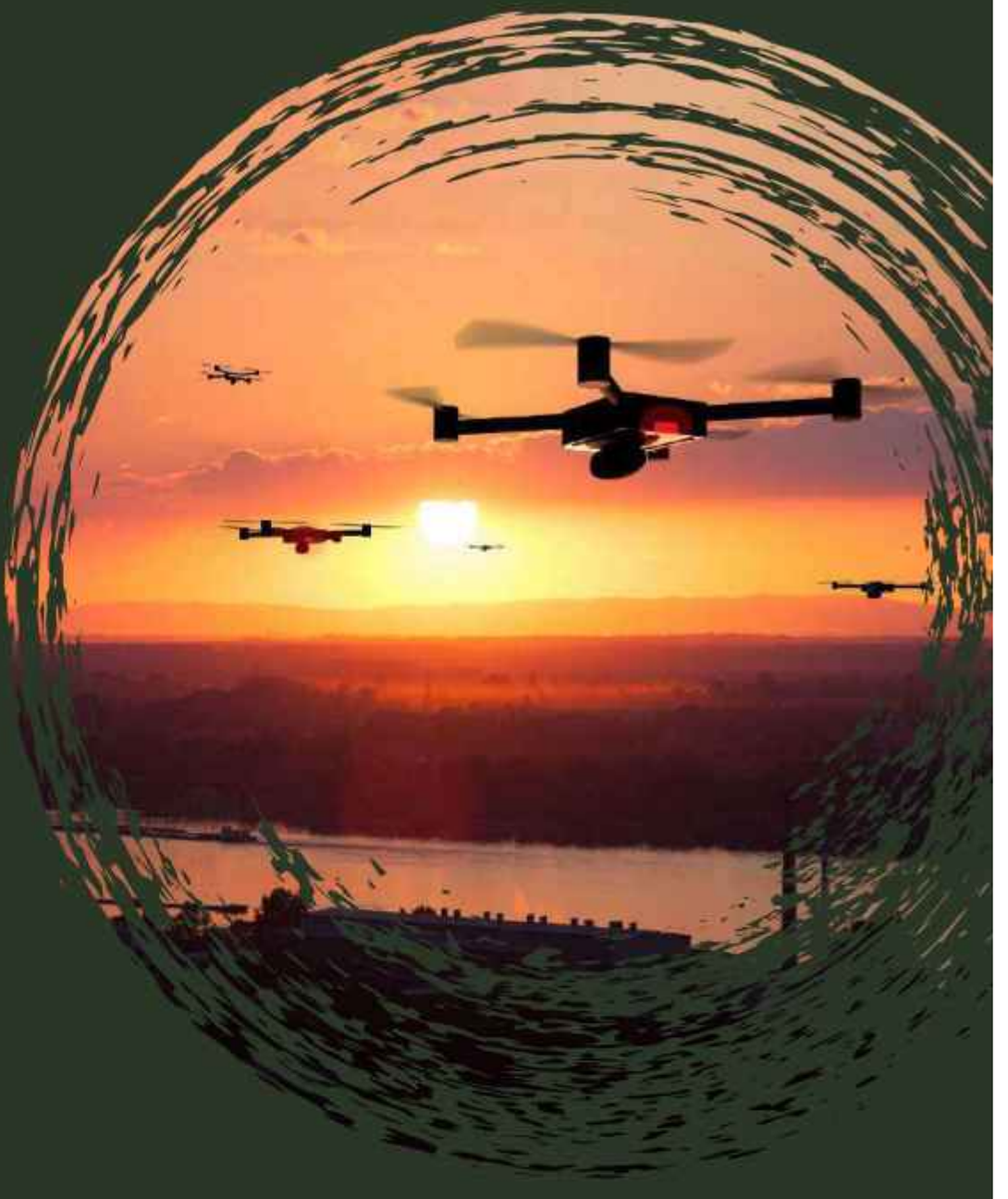

UNMANNED AERIAL SYSTEMS & ROBOTICS

PROBLEM DEFINITION STATEMENT – 14

ALL TERRAIN UNMANNED GROUND VEHICLE

1. What is the Problem (Need)?

Current Unmanned Ground Vehicles (UGVs) struggle with navigating and operating efficiently across varied and challenging terrains limiting their effectiveness in diverse operational environments. UGVs have traditionally been developed for specific applications such as military reconnaissance and search & rescue. Early models were designed to operate in relatively predictable and controlled environments often struggling with obstacles, rough terrain and adverse weather conditions. As the demand for versatile UGVs is growing, the need for more robust, all-terrain capabilities has become evident. Technological advancements in navigation and control systems enhanced by AI and machine learning, as well as innovations in suspension and drive systems are enabling UGVs to better analyse and adapt to their surroundings in real time for improved all-terrain performance.

2. Why it is Important to Solve?

Solving the terrain adaptability issue for UGVs is crucial for expanding their operational use in various critical applications. Enhanced all-terrain capabilities will allow UGVs to perform more effectively in military operations, disaster response and remote exploration where reliable performance in challenging environments is essential.

3. Contemporary Solutions by Other Countries/Organisations.

Not Known.

4. Deliverables.

All Terrain Unmanned Ground Vehicle prototype with advanced all-terrain capabilities and an integrated AI-based navigation system. Should be compatible with all GNSS systems including NAVIC, allowing user to select/deselect. Compatibility with Indian Army Defence Series Maps is desired. Following solutions are being sought:-

(a) **Mountainous Regions.** Tracked UGV with width not more than 4 ft. Payload capacity of 200 kgs or more for logistic carriage and casualty evacuation. Integration with a data relay drone for terrain mapping & navigation would be preferable.

(b) **Plains & Deserts.** Wheeled articulated UGV with independent suspension. Payload capacity of 500-1000 kgs for logistic carriage & casualty evacuation. UGV should be capable of swarming with collision avoidance and on-board AI based terrain mapping for navigation.

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PROBLEM DEFINITION STATEMENT – 15

IC ENGINE BASED LOGISTIC DRONES FOR SUPER HIGH ALTITUDE AREAS

1. What is the Problem (Need)?

Indian Army has already inducted logistic drones of various capabilities and characteristics. The logistic drones face various challenges of altitude restrictions, payload capacity and battery endurance. There is a severe effect on the battery capability in high altitude areas, wherein the present battery packs provide 60 to 90 minutes of endurance, thereby restricting their range. The IC engine based solutions is likely to provide longer endurance & quick reusability through refuelling.

2. Why it is Important to Solve?

The envisaged technology will allow seamless logistic surge to the troops deployed in super high altitude area. An IC engine with endurance of minimum 3 hours will allow continuity of logistic support during critical operations. The capability to operate as a swarm will allow less number of pilots to handle large number of logistic drones.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

Three prototype of IC engine based logistic drones with the following technical requirements:-

(a) Operating altitude of 5500 m AMSL (take off altitude) and further fly upto 1000 m height.

(b) IC engine based designed with emergency battery back up.

(c) Minimum endurance of 3 hours with autonomous flying capability with GNSS system including NAVIC and compatible with Defence Series Map.

(d) Payload capacity of 100 kg. Higher payload capacity upto 200 kg is desirable.

(e) Operational range of minimum 20 km (one way).

(f) Capability to operate as a swarm and deliver to a single location.

(g) Should be able to operate from unprepared landing/ take off pods of size not more than 25 m x 25 m (per bird).

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PROBLEM DEFINITION STATEMENT – 16

HEAVY PAYLOAD LOGISTIC DRONE FOR PLAINS/ DESERT

1. What is the Problem (Need)?

There is a requirement to find a solution for delivering of heavy logistics loads through Drones/ UAV in autonomous mode. Heavy Payload Logistics Drones/UAV will provide flexibility and precision in delivery of critical operational or logistic stores in a short timeframe.

2. Why it is Important to Solve?

To improve efficiency and efficacy of last mile delivery of critical logistic load to forward posts located in plains, which may be a battle winning factor with limited accessibility.

3. Contemporary Solutions by Other Countries/Organisations.

Western countries and United States of America are in the process of building Heavy Lift Logistic Drones/UAVs of similar/higher capability.

4. Deliverables.

Set of three drone prototypes (VTOL) with following capabilities:-

(a) Payload- minimum 200 kg in plains/ desert terrain.

(b) Propelled/ powered by any suitable technology/solution.

(c) Operating altitude - upto 2000 m.

(d) Operating range - 30 km one way.

(d) Operational endurance - minimum two hours.

(e) Transportable using in-service Lorry Ashok Leyland Stallion (ALS).

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PROBLEM DEFINITION STATEMENT – 17

SWARM DRONE BASED MINE DISPENSING SYSTEMS

1. What is the Problem (Need)?

Mine laying have several challenges which restrict operational flexibility and expose troops to high risks. Currently, minefield laying relies heavily on manual or vehicle-based systems, which are time-consuming, resource-intensive & high-risk. An alternate, efficient and autonomous method using swarm drones is needed to be adopted to enhance the speed, precision and safety in minefield laying. Swarm drones offer an autonomous, scalable and faster alternative. These drones can deploy mines over large areas quickly while being controlled remotely, thus minimising troop vulnerability. The changing nature of modern warfare involving autonomous systems and rapid manoeuverability demands innovative solutions.

2. Why it is Important to solve?

To enhance operational flexibility & lay mines dynamically as per threat manifestation. Also reduce own troops' vulnerability to enemy actions.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **United States.** Development of Swarm Drone technologies for reconnaissance & targeted payload deployment.

(b) **China.** Advances in autonomous drones for multi-role missions including logistics and combat support.

(c) **Israel.** Innovative use of drones for battlefield dominance particularly in dynamic scenarios involving counter-mobility.

4. Deliverables.

Key features envisaged are: -

(a) Swarm drones, including swarm algorithms and payload integration.

(b) Software for mission planning, drone control & navigation.

(c) Adaptable payload delivery & deployment mechanism including development of new generation mines for maximum effectiveness.

(d) Mines with features of arming, smart activation, anti-handling mechanism & self neutralisation.

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PROBLEM DEFINITION STATEMENT – 18

STANDOFF RANGE EXPLOSIVE DETECTION SYSTEM

1. What is the Problem (Need)?

Anti-National Elements (ANEs) are utilizing variety of materials for making explosive devices which are having varied chemical compositions, different initiation means & operating mechanisms. The current explosive detectors are based on vapour detection, are susceptible to errors and requires the operator to be in close proximity of the explosive device, thereby increasing the operators vulnerability. To reduce the risk & improve accuracy of detection, there is a need to develop a sensor, mounted on a UGV/drone, which can carry out standoff detection of explosives with high accuracy.

2. Why it is Important to Solve?

In absence of a reliable standoff explosive sensor, the operator is vulnerable during explosive detection task. Therefore, there is a requirement to have a UGV/drone mounted with suitable explosive sensor that can quickly move to the identified area & accurately detect the explosive.

3. Contemporary Solutions by Other Countries/Organisations.

R&D on various explosive sensing technologies is under progress in various countries. An autonomous system for IED detection is already being employed by Israel.

4. Deliverables.

Standoff Range Explosive Detection Sensors that can be mounted on a UGV/ drone for detection of explosives. The system should have multiple detection capabilities to detect various types of explosives, provide visual feed & transfer data remotely.

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PROBLEM DEFINITION STATEMENT – 19

CARDBOARD DRONES

1. What is the Problem (Need)?

Modern warfare requires low-cost, easily deployable and effective systems for surveillance / targeting in challenging and contested environments. Traditional drones are expensive, require sophisticated materials and can be difficult to produce at scale. The need for a lightweight, cost-effective and sustainable solution has emerged to address operational challenges in such scenarios.

2. Why it is Important to Solve?

Cardboard drones leverage simple yet robust engineering to address mission-critical needs in a cost-effective manner. These drones are made from flat-pack material which are easy to assemble and transport. Such drones reduce the risk of detection and countermeasures in contested zones and can be manufactured at scale at relatively lower costs.

3. Contemporary Solutions by Other Countries/Organisations.

Australian firm Sypaq has developed 'Corvo Precision Payload Delivery System' (PPDS), which has reportedly been used in ongoing Russia Ukraine conflict.

4. Deliverables.

A lightweight, flat-packable cardboard drone designed for surveillance / kamikaze role alongwith required accessories for undertaking operational missions. The drone system should have the following capabilities:-

(a)	Operating range	- Minimum 15 km.
(b)	Operating endurance	- Minimum 45 minutes.
(c)	Operating altitude	- 3000 meters AMSL (Above Mean Sea Level).
(d)	Operating temperature	- Minus 10°C to plus 50°C.
(e)	Payload	- EO / IR Camera with option to add explosive payload for kamikaze role.

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COMMUNICATION & ELECTRONIC WARFARE

PROBLEM DEFINITION STATEMENT – 20

HANDSFREE SHORT RANGE INTER COMMUNICATION DEVICE

1. What is the Problem (Need)?

In a dense mechanised operational environment, it is difficult for a Section/ Platoon Commander of Mechanised Infantry to execute effective command and control over his troops. Existing handheld communication devices restricts movement of an operator. Hence, a need is felt to provide handsfree short range inter communication device for Infantry Stick of Mechanised Infantry.

2. Why it is Important to Solve?

Inter communication between persons of a section and platoon is affected by battle noises and the ability to operate a weapon with a handsfree communication device/ radio does not exist. A handsfree/ wrist mounted communication device will allow inter communication within the section successfully.

3. Contemporary Solution by Other Countries/ Organisations.

Bone conduction inter communication technology available with USA.

4. Deliverables.

(a) A short-range, robust, light weight and secure communication device with an earpiece/ wrist mounted (Preferably based on Bone Conduction technology).

(b) Effective range upto 200 m.

(c) Ability of communication even in intense jamming environment.

(d) Interoperability of communication device with in service radio sets upto platoon level.

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PROBLEM DEFINITION STATEMENT – 21

TETHERED DRONE SYSTEM AS RADIO RELAY STATION

1. What is the Problem (Need)?

Presently, to extend the connectivity over radio frequency, retractable antenna masts are being used for radio relay. Due to limitation of height of masts, Line of Sight communication between two nodes is a challenge. Therefore, it is imperative to develop a drone-based radio relay station to extend the ranges of radio relay connectivity.

2. Why it is Important to Solve?

It is essential to enhance the ranges of radio relay equipment which are being used for communication between tactical networks.

3. Contemporary Solutions by Other Countries/ Organisations.

There are few International companies into design, development and manufacturing of tethered drone system. However, details regarding using such technologies as radio relay stations is not available.

4. Deliverables.

The system should be based on multi-copter technology which would have suitable platform to securely fix and carry a Radio Relay repeater station with antenna. The drone could be tethered with a ground based light vehicle for power supply. Tethered Drone System should have the following capabilities:-

(a) Ability to carry two sets of Radio Relay equipment (approx weight 86 kgs), two sets of antennae (approx weight 14 kgs) and accessories (approx weight 05 kgs), i.e total approx weight of 105 kgs, up to a height of minimum 100 meters above ground level and provide a stable platform for carrying out its operations continuously for minimum of 6 hours.

(b) Sustain winds up to 45- 50 Knots.

(c) Inherent power source for both tethered drone and Radio Relay equipment.

(d) Operate in temperatures ranging from minus 20°C to plus 50°C.

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PROBLEM DEFINITION STATEMENT – 22

MANPACK ANTI GNSS BUBBLE (2-3 KM)

1. What is the Problem (Need)?

Navigation technologies based on GNSS are becoming popular for location-based applications, target detection, missile guidance, precision approach guidance for Unmanned Aerial System (UAS). There is a need to develop a man-portable system capable for creating a 2-3 kms of protection bubble to protect personnel and assets from UAS, precision guided weapons/ missiles that uses satellite position systems by jamming the Command & Control link and jamming & spoofing of Global Navigation Satellite System (GNSS).

2. Why it is Important to Solve?

UAS and other threats based on GNSS are likely to increase during the conventional operations. Small sized and commercially available drones are being increasingly used not only to target vital areas but also to undertake pin point targeting of personnel deployed on ground, as witnessed in the recent conflicts.

3. Contemporary Solutions by Other Countries/ Organisations.

Solutions like Drone Gun (Australia), Black Sage UASX (USA), ECS Scorpion (Canada), Blighter AUDS etc are portable jammer that can disrupt GNSS and other RF signals used by drones upto 1-2 km. These solutions are man-portable with backpack configuration, which is suitable for rapid deployment.

4. Deliverables.

An agile, robust and efficient solution to protect personnel and assets from UAS threats is required to be developed. This will entail development of man-portable, lightweight, omnidirectional Anti GNSS system to create bubble of 2-3 kms. The system should be easily upgradable to evolving C-UAS technologies.

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PROBLEM DEFINITION STATEMENT – 23

DECODER & CLASSIFIERS FOR RF SPECTRUM INCLUDING UAS

1. What is the Problem (Need)?

Electronic Warfare (EW) System including anti Unmanned Aerial System (UAS) worldwide rely mostly on spectrum-based detection as the key means of gaining intelligence. However, for system to be effective, accurate technical assessment, detailed characteristics such as modulation types, encoding schemes and encryption methods must be available.

2. Why it is Important to Solve?

For any EW system to be effective, detailed characteristics of the RF signals such as modulation types, encoding schemes and encryption methods must be known.

3. Contemporary Solutions by Other Countries/ Organisations.

Globally available solutions like go2MONITOR, WCODE etc have fully automatic approach for interception, classification, demodulation, decoding and recording of RF signals in a wideband spectrum environment.

4. Deliverables.

(a) Hardware & software solution enabling accurate technical assessment of RF signatures (including anti UAS) of waveforms including detailed characteristics such as modulation types, encoding schemes and encryption methods. This should result in creation of libraries.

(b) On successful decoding/ decryption, these libraries are to be updated for auto decoding of such signals in future and also serve as an updated threats library of waveforms, modulation and coding schemes, thereby facilitating fingerprinting and assisting in crypto-analysis.

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PROBLEM DEFINITION STATEMENT – 24

TETHERED DRONE BASED COMINT & ELINT RECEIVERS

1. What is the Problem (Need)?

Electromagnetic Spectrum is a critical domain, where its control and exploitation can significantly influence the outcome of military operations. The increasing use of sophisticated communication and radar systems by adversaries necessitates advanced Electronic Support Measures (ESM) to detect, identify and counter these threats. Traditional ground-based ESM systems have limitations in terms of Line of Sight and range, restricting their effectiveness in dynamic and complex operational environments. Tethered drone based ELINT receivers are advanced systems used in Electronic Warfare (EW) for detecting, identifying and locating sources of electromagnetic emissions.

2. Why it is Important to Solve?

Implementing tethered drone based ELINT receivers will significantly enhance electronic warfare capabilities by providing a high vantage point for signal detection, increasing coverage area and improving response time. This advancement will lead to enhanced situational awareness, effective threat identification, classification and improved decision-making in complex operational environment.

3. Contemporary Solutions by Other Countries/ Organisations.

Solutions like Sky Sapience Hover Mast (Israel), Elistair Safe-T (Russia), Drone Shield Drone Sentry-C2 (Israel) and Persistent Systems MPU5 (USA) have been developed.

4. Deliverables.

Tethered Drone based Communication Intelligence (COMINT) & Electronic Intelligence (ELINT) receiver with operating height of around 50-150 meters, at an altitude of more than 3000 meters, payload capacity of approx 50 kgs, continuous power supply and reliable high-speed data transmission over the tether. Developer is required to develop tethered drone, COMINT equipment & ELINT equipment. Tethered Drone System should have the following other capabilities: -

(a) Provide a stable platform for carrying out its operations continuously for minimum of 6 hours.

(b) Be able to sustain winds up to 45-50 Knots.

(c) Inherent power source for both tethered drone and COMINT equipment & ELINT equipment.

(d) Be able to operate in temperatures ranging from minus 20°C to plus 50°C.

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PROBLEM DEFINITION STATEMENT – 25

FREE SPACE OPTICS EQUIPMENT

1. What is the Problem (Need)?

Traditional wired i.e. Optical Fiber Communications (OFC) & wireless networks like Radio Relays face several limitations in military operations, including vulnerability to physical damage, limited mobility and dependency on existing infrastructure. These limitations necessitate the exploration of alternative solutions similar to Free Space Optics (FSO) to ensure robust and secure communication.

2. Why it is Important to Solve?

FSO link offers data speed greater than 10 Gbps. The technology is envisioned as supplement to existing mission critical OFC links for the backbone communication and to provide adequate bandwidth for enhanced requirements of units/ formations in the remote areas.

3. Contemporary Solutions by Other Countries/ Organisations.

(a) **DARPA.** US Defence Advanced Research Projects Agency (DARPA) has invested in program like Free-Space Optical Experiential Network (FOENEX) that aims to provide high capacity (upto 10 Gpbs) low latency in contested environments for communication across UAVs, aircrafts & ground units, enhancing high bandwidth & security.

(b) **OPTIMA.** European Union (EU) funded OPTIMA project focuses on FSO for military application, providing robust communication link upto 15 km range, working under challenging atmospheric conditions with data rates of 5-10 Gbps.

4. Deliverables.

Two pairs of Free Space Optics equipment with data rates upto 10 Gbps at range of 20 kms, along with all accessories like antenna mast, connectors, etc.

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PROBLEM DEFINITION STATEMENT – 26

AUTO OPTICAL AXIS ALIGNMENT FOR FREE SPACE OPTICS

1. What is the Problem (Need)?

Reliance on Free Space Optics (FSO) for high-speed communication has increased manifold. Efficacy of FSO links is significantly impacted by environmental factors. Current alignment mechanisms are either manual or semi-automatic, leading to increased downtime and operational delays. Auto alignment allows quick deployment and seamless operations boosting combat readiness of any field formation.

2. Why it is Important to Solve?

In modern times, ability to transmit large volumes of data in quick time frame is the key to achieve strategic advantage over the adversary. Automatic aligned FSO system can save time and reduce the errors, thereby providing support to advanced applications requiring high-definition video surveillance, secure communication, rapid data sharing and enhancing situational awareness of higher commanders.

3. Contemporary Solutions by Other Countries/ Organisations.

(a) **DARPA & MIT (USA).** Self-Aligned FSO system capable of handling multiple communication channels using space division multiplexing.

(b) **Germany.** Fraunhofer Institute of Applied Optics and Precision Engineering has developed adaptive FSO to compensate for atmospheric turbulence & vibrations.

4. Deliverables.

Two pairs of automatic, self-aligned, adaptive optical axis alignment system (both hardware & software) for Free Space Optics equipment which compensates for atmospheric conditions including air turbulence & vibrations.

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PROBLEM DEFINITION STATEMENT – 27

LPI WAVEFORM FOR SOFTWARE DEFINED RADIOS

1. What is the Problem (Need)?

Due to advancements in Electronic Warfare (EW) technologies, adversaries have adopted measures to intercept conventional communication waveforms through signal detection, Direction Finding (DF) and jamming. The militaries globally have shifted from analog to digital communications, leading to increased susceptibility to sophisticated EW attacks. Traditional waveforms used in Software Defined Radios (SDRs) are vulnerable to adversary's interception & jamming measures. Developing a Low Probability of Interception (LPI) waveform is critical to ensure secure, undetectable communication especially in highly contested electromagnetic (EM) environment and asymmetric scenarios.

2. Why it is Important to Solve?

(a) **Secure Communication**. To safeguard own vulnerability and critical military installations during hostilities, LPI waveforms needs to be incorporated in SDRs. LPI waveforms ensure undetectable communication preserving integrity of mission critical operations during conflicts.

(b) **Safeguarding Tactical and Strategic Operations**. Without LPI waveforms, units/formations are vulnerable to interception and jamming, ultimately resulting in exposing the vulnerabilities. LPI waveforms can make own communication links inherently resistant to jamming.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **USA**. Employs Optical Frequency Domain Multiplexing and ultra-wideband communications in SDRs.

(b) **Russia**. Utilises LPI techniques like Chirp Spread Spectrum (CSS) and pseudo random noise modulation in military communications.

4. Deliverables.

Low Probability of Interception (LPI) waveform for SDRs for secure, undetectable communication especially in highly contested EM environment. The waveform should get imported into SDR (VHF/UHF) being indigenously developed.

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SITUATIONAL AWARENESS / INTELLIGENCE SURVEILLANCE & RECONNAISSANCE/ SENSORS

PROBLEM DEFINITION STATEMENT – 28

TETHERED DRONE FOR MR-BFSR

1. What is the Problem (Need)?

Future battlefield requires timely detection of targets for acquiring Intelligence, Surveillance and Reconnaissance (ISR) inputs for planning degradation operations. Medium Range Battle Field Surveillance Radar (MR-BFSR) have detection range of up to 40 kms; however require clear electronic line of sight to achieve optimum ranges. To achieve clear electronic line of sight, there is a requirement of development of tethered drone-based solution which can provide an elevated platform for the radar head.

2. Why is it Important to Solve?

MR-BFSRs are an important element of the surveillance grid and require clear electronic line of sight to achieve optimum ranges. Lack of adequate height differential results in reduced surveillance ranges. Tethered drones can provide the required elevated platform and can be effectively employed in EW environment providing persistent watch over desired area of interest.

3. Contemporary Solutions by Other Countries/Organisation.

Not known.

4. Deliverables.

Set of two tethered drones with required tether, power supply system, ground control system including mounting and stabilisation arrangements for MR-BFSR radar head. Tethered Drone System should have the following capabilities:-

(a) Ability to carry the radar head of MR-BFSR having an approximate weight of 50 kgs up to a height of minimum 50 m and provide a stable platform to the radar for continuous operations for minimum of 6 hours.

(b) Cater for transmission of information from radar head of MR-BFSR to its control panel.

(c) Take off from minimum 4000 m above mean sea level.

(d) Sustain winds up to 45-50 knots.

(e) Easy to operate requiring a crew of not more than four persons.

(f) Inherent power source for both tethered drone and radar.

(g) Operate in temperatures ranging from minus 20°C to plus 50°C.

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PROBLEM DEFINITION STATEMENT – 29

ADVANCE MOBILE MAST FOR EO DEVICES AND MR-BFSR

1. What is the Problem (Need)?

Electro Optical (EO) devices and Medium Range Battle Field Surveillance Radar (MR-BFSR) have detection ranges up to 20 to 40 kms and require raised platforms for clear optical and electronic line of sight. Provision of a vehicle mounted mobile mast with minimum height of 30 meters can provide a viable solution.

2. Why it is Important to Solve?

Ground Based Surveillance System like EO divices and MR-BFSR are an important component of the ISR grid. Since these devices require clear optical/ electronic line of sight, a vehicle based mobile mast providing 30 meters height post erection is required for persistent watch over desired area of interest.

3. Contemporary Solutions by Other Countries/ Organisation.

Mobile masts like Mobile 30 meter mast manufactured by Systeme Ingenierie Telecom & Reseaux of France are available in the international market, however, indigenous solution is sought.

4. Deliverables.

Vehicle Mounted Mobile Mast with suitable mounting arrangements for mounting EO device / MR-BFSR radar head. The mast should have the following capabilities :-

(a) Provide a minimum height of 30 meters to the EO device / MR-BFSR.

(b) Should be based on a 4x4 / 6x6 vehicle.

(c) Electrically powered with the vehicle having an inherent power source for both the mast as well as EO device / MR-BFSR.

(d) Capable of deployment /re-deployment within 15 minutes.

(e) Facilitate zeroing / alignment of the device and be able to sustain winds up to 45-50 knots.

(f) Compatible with LORROS, MR-BFSR and similar in-service surveillance equipment.

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PROBLEM DEFINITION STATEMENT – 30

HELICOPTER TRACKING SYSTEM

1. What is the Problem (Need)?

Military helicopters are required to fly low in the battle zone. Accurate real time position of aircrafts is required to enhance / modify / upgrade tactical plans. VHF/ Radio based system cannot track live position of the helicopters due to inherent property of electromagnetic waves of propagation in line of sight only.

2. Why is it Important to Solve?

Effective monitoring of the aircrafts within the Tactical Battle Area (TBA) is an inescapable pre-requisite for successful exploitation of air assets. Helicopter Tracking System will facilitate real time position reporting which in turn helps overcome limitations of position reporting over voice communication like inadequate / delayed information regarding location of own helicopters, inability to undertake dynamic tasking for engagement of emerging threats, inefficient de-confliction of airspace and consequent dependence on procedural control rather than positive control.

3. Contemporary Solutions by Other Countries / Organisations.

Aircraft tracking system like HeliTracker and SkyConnect Tracker systems are available in the international market, however the same cannot be used due to security and secrecy issues and hence, indigenous solution is sought.

4. Deliverables.

An indigenous hand-held system like the contemporary portable SATCOM (satellite communication) phone working on indigenous satellite system with built in power source and antenna, which can be used by aviators to report position by voice / data (SMS) in an encrypted format at regular intervals of 30-60 seconds with provisions for automatic / manual reporting.

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PROBLEM DEFINITION STATEMENT – 31

HOLOGRAPHIC SAND MODEL

1. What is the Problem (Need)?

All training institutions and field formation in the Indian Army exploit sand models for training purposes, visualization of terrain and for planning operations. The erstwhile sand model which took extensive time, effort and manpower to prepare were replaced with prefabricated terrain models, especially in training institutions to save precious time during intense schedule of courses. Making of prefabricated models has evolved from mould method of preparation to utilising 3D printing, thereby enhancing the accuracy of these models.

2. Why it is Important to Solve?

The current prefabricated terrain models are prepared through moulds and falls short of replication of the exact terrain. Even 3D printed sand models have few drawbacks like, pre-fabricated terrain models requiring time to prepare and are costly. Once prepared, these prefabricated terrain models do not enable any change.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

The proposed holographic projection system should be able to project a terrain model of size 10m x 6m with assistance of Geographic Information System (GIS). The system should have capability of exact replication of terrain as given in maps and google imagery. In addition to the relief as given in maps, the system should be able to replicate the terrain to include snow cover, forested area, built up areas, water body etc. The projected holographic terrain model should be visible accurately from all directions and angles to facilitate accurate visualization of all students seated in the sand model rooms. The application should be interactive to facilitate addition and deletion of details as per user customization.

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PROBLEM DEFINITION STATEMENT – 32

360° SITUATIONAL AWARENESS KIT WITH DRIVER ASSISTANCE FOR PMV

1. What is the Problem (Need)?

Situational awareness system is required for protected vehicles which have restricted visibility towards sides and rear, when operating in high threat environment. The system should also be able to operate at night, to enable driving without headlights/ convoy lights, thereby reducing the chances of detection during tactical operations.

2. Why it is Important to Solve?

By providing a comprehensive, all-around view of the vehicle's surroundings through high-resolution cameras and advanced processing algorithms, the kit will enable drivers to detect and respond to potential threats and obstacles in real time. Additionally, onboard data storage will support mission analysis and post-operation review contributing to enhanced tactical planning and operational readiness. This technology will significantly boost the safety and effectiveness of Protected Mobility Vehicles (PMV) by minimizing blind spots, reducing the risk of accidents and enhancing overall situational awareness.

3. Contemporary Solutions by Other Countries/Organisations.

Exists with Foreign OEMs and commercial vehicles. However, an indigenous military grade solution is required to be developed.

4. Deliverables.

(a) **Field of view.** Full 360° field of view around the vehicle ensuring no blind spots and comprehensive situational awareness for the driver and crew.

(b) **Camera resolution.** Resolution of at least 2K (1920x1080 pixels).

(c) **Thermal imaging resolution.** Minimum resolution of 640 x 480 pixels with clear visibility range of at least 300 m.

(d) **VR goggles display resolution.** Resolution of 1920x1080 pixels per eye for the driver & co-driver during night operations.

(e) **Low-light sensitivity.** Cameras should operate effectively in low-light conditions with a minimum illumination level of 0.01 lux enabling night-time and low-visibility operations without additional lighting.

(f) **Processing latency.** Not more than than 100 milliseconds to provide real-time feedback and assist in rapid decision-making during driving.

(g) **Environmental resistance.** All components must be ruggedized to withstand harsh environments, with an Ingress Protection (IP) rating of IP67 or higher.

(h) **Object recognition.** Driver assist software should be capable of recognizing and classifying objects (such as vehicles, humans and animals) or obstacles with an accuracy rate of 95% or higher.

(j) **Audio-visual alerts.** The kit should provide clear audio and visual alerts within one second of detecting a potential hazard or obstacle.

(k) **Power consumption.** The total power consumption of the situational awareness kit should not be more than 300 watts to ensure it does not significantly impact the vehicle's power systems and can operate efficiently over long periods.

(l) **Data storage.** The system should have onboard data storage capacity of at least 1 TB (terabyte) to record continuous video footage and sensor data.

(m) **Mounting.** System should be easily mountable on any vehicle based on mountable brackets with minimum modification on the body of vehicle.

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PROBLEM DEFINITION STATEMENT – 33

HAND HELD THROUGH WALL RADAR

1. What is the Problem (Need)?

Indian Army is constantly involved in conducting intense Counter Insurgency /Counter Terrorist operations, wherein close quarter combat, room intervention and hostage rescue operations are inherent. Equipping troops with Hand Held Through Wall Radar will not only exponentially improve the operational capability of our forces by providing first hand info of targets behind walls/obstacles, but also increase the survivability of our troops by enhancing their situational awareness in built up area.

2. Why it is Important to Solve?

The envisaged technology will enhance the situational awareness of troops in built up areas, leading to enhanced survivability and operational efficiency.

3. Contemporary Solutions by Other Countries/Organisations.

Xaver 1000 of Israel.

4. Deliverables.

Hand Held Through Wall Radar with following capabilities is expected :-

(a) **Weight .** Less than 10 Kg.

(b) **Penetration.** Upto a depth of 0.5 m of building materials including stone based walls.

(c) **Detection Range.** 20 m behind wall of static and moving targets.

(d) **Field of View (FoV).** 60 to 90 degrees in both azimuth and elevation.

(e) **Display.** A Human Machine Interface (HMI) screen with 2D/ 3D display of objects detected

(f) **Endurance.** 4 to 8 hours.

(g) User friendly interface.

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Situational Awareness/Intelligence Surveillance&Reconnaissance/Sensors

PROBLEM DEFINITION STATEMENT – 34

LONG RANGE OPTICAL TARGET LOCATOR

1. What is the Problem (Need)?

Troops in modern warfare are often exposed to threats including surprise attacks by well-planned and camouflaged ambushes and sniping. A device that provides a signature of the enemy's optical devices will augment the surveillance grid. There is a requirement of a Long Range Optical Target Locator (LROTL) capable of detecting and locating active or passive optical device of the enemy from a distance.

2. Why it is Important to Solve?

Ground forces must be equipped with necessary tools for surveillance, locating hostile forces and responding effectively and rapidly with minimum exposure to threats. This equipment will provide an important tool for detection of commonly employed active or passive surveillance devices.

3. Contemporary Solutions by Other Countries/Organisations.

Not known

4. Deliverables.

Two set off active laser based LROTL capable of detecting active and passive observation devices with following parameters:-

(a) **Range.** Minimum 4000 m.

(b) **Operating Altitude.** 5500 m.

(c) **Operating Temperature.** Minus 35°C to plus 50°C.

(d) **Azimuth Coverage.** Upto 90°.

(e) **Elevation.** Upto 45°.

(f) **Weight.** Not more than 20 kgs with tripod.

(g) Mounted on tripod with motorized gimbal having data recording & relaying capabilities.

(h) **Endurance.** Four to six hours on battery.

(j) AI based classification of target is desirable.

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PROBLEM DEFINITION STATEMENT – 35

WIDE BAND GaN BASED TRANSMISSION / RECEPTION MODULES

1. What is the Problem (Need)?

Wide Band GaN based T/R modules are gaining traction in various applications such as radars, communication systems and electronic warfare, due to their high efficiency, power density and ability to operate at higher frequency & temperatures, as compared to traditional materials like Silicon or Gallium Arsenide. There is a need to develop indigenous GaN based T/R modules for Air Defence (AD) radars for better performance.

2. Why it is Important to Solve?

GaN based T/R modules are the future of Active Electronically Scanned Array (AESA) technology radars around the world, being more sensitive and efficient in detection.

3. Contemporary Solutions by Other Countries/Organisations.

Most of the developed nations are already using GaN based technology in radars.

4. Deliverables.

(a) Indigenous development of GaN based T/R modules.

(b) Customisation as per requirements of future AD radars.

(c) No foreign based software or hardware, so as to avoid dependency on Foreign OEM.

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PROBLEM DEFINITION STATEMENT – 36

SPOOFING RESISTANT PNT SOLUTION

1. What is the Problem (Need)?

The development of Anti-Satellite Weapons and space-based threats have introduced new risks to Global Navigation Satellite System (GNSS) constellations. The growing importance of space domain awareness and counter-space capabilities has led to increased investment in alternative navigation systems. The vulnerabilities of GNSS include signal dependence and susceptibility to intentional interference, spoofing and jamming by adversaries. This underscores the need for a comprehensive Spoofing Resistant Positioning, Navigation & Timing (PNT) Solution. This system must leverage indigenous technologies, ensure robust navigation and provide enhanced resistance to interference, spoofing and jamming.

2. Why it is Important to Solve?

A viable solution is Inertial Navigation Systems (INS) utilizing Micro Electro-Mechanical Systems (MEMS) sensors. A solution for INS utilizing Quantum Mechanics is another field required to be explored. A robust navigation system will ensure uninterrupted operations across various sectors, including defence, aviation, maritime and critical infrastructure.

3. Contemporary Solutions by Other Countries/Organisations.

Alternative Navigation Program of USA includes the development of eLORAN, a terrestrial navigation system providing positioning accuracy within 100 meters. European Union's HELIOS program utilizes cellular networks to provide location-based services, independent of GNSS. Russia's System for Differential Correction and Monitoring (SDCM) enhances GLONASS accuracy, while providing GNSS-independent capabilities. SDCM utilizes terrestrial reference stations to correct signal errors. China's BeiDou Navigation Satellite System includes a terrestrial component, utilizing pseudolites to provide indoor and outdoor navigation.

4. Deliverables.

Development of an indigenous Spoofing Resistant Positioning, Navigation & Timing (PNT) solution for continuity of operations in a GNSS disrupted environment. The solution should be equipment/ platform agnostic.

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PROBLEM DEFINITION STATEMENT – 37

ATOMIC CLOCK FOR TIMEKEEPING IN GNSS DENIED ENVIRONMENT

1. What is the Problem (Need)?

Initially, Global Navigation Satellite System (GNSS) signals were considered sufficient for precise timing, but increasing vulnerability to jamming and spoofing has highlighted the need for alternative timing solutions. Precise timekeeping is crucial for modern military operations, enabling secure communications and navigation. GNSS signals facilitate the same, but vulnerability to electronic warfare necessitates an independent, accurate and resilient timing solution.

2. Why it is Important to Solve?

Solving the Atomic Clock problem in a GNSS denied environment is crucial for the Armed Forces as precise timing is essential for operational effectiveness. Inaccurate timing can compromise synchronization of military operations, communication networks and weapon systems. Reliable Atomic Clock enable seamless coordination between units / formations, ensures accurate targeting & navigation and facilitates secure communication.

3. Contemporary Solutions by Other Countries/Organisations.

United States is leading the research through DARPA's Atomic Clock with Enhanced Stability (ACES) program, NASA's Deep Space Atomic Clock (DSAC) and the US Air Force's Navigation Technology Satellite System (NTSS). Israel is also developing Atomic Clock through Israel Aerospace Industries (IAI). Key technologies being explored include Chip Scale Atomic Clocks (CSACs), quantum-based timing solutions and advanced materials and manufacturing techniques to achieve compact, high accuracy Atomic Clocks.

4. Deliverables.

To design and develop a portable, power-efficient and highly accurate miniature Atomic Clock for military purpose in GNSS denied environments, ensuring synchronization and continuity across diverse platforms. Atomic Clock should be equipment/ platform agnostic.

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PROBLEM DEFINITION STATEMENT – 38

GNSS INDEPENDENT PNT SYSTEM

1. What is the Problem (Need)?

Vulnerability of Global Navigation Satellite System (GNSS) dependent military operations has significantly increased over time due to various factors. Reliance only on Global Positioning System (GPS) for navigation and positioning may compromise security due to its vulnerability to interference, jamming and spoofing. India's strategic interests necessitate a self-reliant navigation system, leveraging indigenous expertise. The development of an indigenous GPS-independent navigation system will ensure continuity of operations despite GPS disruptions, enhancing operational effectiveness. This system will also facilitate requirements for autonomous systems, unmanned vehicles and precision-guided munitions.

2. Why is it Important to Solve?

By leveraging indigenous expertise, the Army can overcome GPS vulnerabilities and ensure continued operational effectiveness. A robust navigation system will ensure uninterrupted operations across various sectors, including defence, aviation, maritime and critical infrastructure.

3. Contemporary Solutions by Other Countries/ Organisations.

Several countries have developed or are developing GNSS-independent Precision Navigation and Timing (PNT) services to mitigate GPS vulnerabilities. Notable initiatives include Norway's Navia, a GNSS-independent navigation system utilizing terrestrial signals, Australia's Jindalee Operational Radar Network (JORN), providing PNT services through radar technology. These global efforts demonstrate the importance of developing GNSS-independent PNT services to ensure continued operational effectiveness in contested environments. With the announcement of the National Quantum Mission by Govt of India in April 2023, Thematic Hub in the field of Quantum Sensing & Metrology is being established. This provides an opportunity for development of an indigenous Quantum Mechanics based Navigation System.

4. Deliverables.

Development of an indigenous GNSS independent PNT system which is not vulnerable to interference, jamming and spoofing. The solution should be equipment agnostic.

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PROBLEM DEFINITION STATEMENT – 39

HEAD MOUNTED CAMERA SYSTEM FOR MILITARY WORKING DOGS

1. What is the Problem (Need)?

Military Working Dogs (MWDs) are being used as force multipliers in Counter Insurgency and Counter Terrorism operations. Assault dogs are frequently employed in these operations, where in these dogs operate beyond the visual range without their handler for room intervention and to attack Anti- National Elements with weapons. There is a requirement of a head mounted camera system, which if fitted on the dog can transmit real time video feed to own troops.

2. Why it is Important to Solve?

The system will aid in enhanced situational awareness, minimise own casualty and improve response.

3. Contemporary Solutions by Other Countries/Organisations.

Proprietary wearable devices for MWDs are available ex import but are cost prohibitive.

4. Deliverables.

(a) A cost effective, head mounted camera system fitted to the dog to transmit real time video feed to smartphones/tablets/digital devices held with own troops following the MWDs (approximately 500m to 1 km behind) for gaining information about the number, location, weapons held with militants in order to plan an effective response.

(b) A digital transmitter to ensure secure communication by which the handler can pass command to the dog remotely and a light weight, robust camera, comfortably positioned on the dog's head which should function without internet.

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PROBLEM DEFINITION STATEMENT – 40

SMART COLLARS FOR MILITARY WORKING DOGS

1. What is the Problem (Need)?

Military Working Dogs (MWDs) are regularly used in Counter Insurgency operations and HADR tasks, thereby exposing them to extreme weather conditions and often strenuous physical exertion. Canines are prone to suffer from heat stress, cardiac health issues and collapse in severe strenuous activities, especially in extreme weather conditions. Presently, the handler uses his judgment and experience to assess the health condition of the dog. However, there is a requirement of a suitable device which can monitor the physical condition of the MWD.

2. Why it is Important to Solve?

To reduce fatal & non-fatal casualties in MWDs.

3. Contemporary Solutions by Other Countries/Organisations.

Smart collars are being used by developed armies for the canine assets.

4. Deliverables.

Smart collars which can alert the handler about the physical condition of the dog just like the Garmin activity trackers/ Apple watches, about vital parameters like body temperature, pulse, respiration as well as give information about other activity levels like heart rate variability, calorie expenditure etc.

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ARMAMENT & AMMUNITION

PROBLEM DEFINITION STATEMENT – 41

FRAGMENTATION ROUNDS FOR 12.7 MM SECONDARY ARMAMENT OF TANKS

1. What is the Problem (Need)?

Modern battlefield is likely to have a mix of medium and high altitude Unmanned Aerial Vehicles (UAVs) and Unmanned Combat Aerial Vehicles (UCAVs) capable of precision strikes on Armoured Fighting Vehicles (AFVs). Tank is equipped with 12.7 mm Anti-Aircraft Gun, which in the present configuration is not very effective against smaller cross section and fast moving aerial targets like UAVs/ UCAVs. In the recent war between Armenia and Azerbaijan, drones were extensively used for both surveillance and attack. The attack drones of Azerbaijan, also known as kamikaze drones, loitered over the battle field, acquired tank targets and crashed into Armenian tanks. With militaries pushing for development and acquisition of UAVs/ UCAVs, it is imperative that a solution be evolved to counter UAS effectively. Thus, without additional anti-drone equipment onto the tanks, there is a requirement of enhancing the capability of existing 12.7 mm Anti-Aircraft Gun, which can be achieved by firing fragmentation rounds.

2. Why it is Important to Solve?

Traditionally, AFVs have been designed to provide adequate protection against ground based anti-tank platforms and limited protection from third dimension threat. Innovative use of drones pose a significant challenge to AFVs. Hence, it becomes prudent to enhance own survivability by firing fragmentation rounds towards incoming aerial threat.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

12.7 mm Fragmentation Round for Secondary Armament i.e. 12.7 mm Anti-Aircraft Gun of T-90 and T-72 tanks.

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PROBLEM DEFINITION STATEMENT – 42

30 MM FRAGMENTATION AMMUNITION FOR AERIAL ENGAGEMENT

1. What is the Problem (Need)?

Aerial threat to AFV platforms has increased manifold over the last decade, which necessitates requirement of developing fragmentation ammunition, wherein sensors will initiate ammunition in proximity to smaller cross section and fast-moving aerial platforms, thereby rendering them incapable of flight or destroying the payload. Towards the same, a need is felt to develop Fragmentation Ammunition against aerial targets for engagement by in-service 30 mm Cannon Gun.

2. Why it is Important to Solve.

Use of fragmentation ammunition against aerial targets will ensure increased probability of engaging aerial targets, thereby enhancing own survivability. Availability of fragmentation ammunition will also enable the likelihood of engaging multiple targets successfully.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

30 mm Fragmentation Ammunition with sensor to initiate the ammunition in close proximity to aerial target, by in-service 30 mm Cannon Gun 2A42 mounted on ICV BMP-2/ 2K.

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PROBLEM DEFINITION STATEMENT - 43

120 MM MORTAR FOR CARRIER MORTAR TRACKED

1. What is the Problem (Need)?

At present 81 mm Mortar mounted on Carrier Mortar Tracked (CMT) of BMP chassis is utilised by Mechanised Infantry for conduct of operations. Due to upgradation of surveillance devices coupled with degree of protection available with both mobile and static targets, it becomes prudent to enhance lethality and degradation capabilities of weapon systems respectively. In view of the above imperatives, there is a requirement for upgradation of existing 81 mm Mortar to 120 mm Mortar on Carrier Mortar Tracked (CMT) for Mechanised Infantry.

2. Why it is Important to Solve?

Effectiveness of close support weapons needs to be enhanced to suitably degraded the target by enhancing quality of close support with more firepower (TNT) delivered on targets. 120 mm Mortar system is already in service with IA and the same can be integrated on CMT.

3. Contemporary Solutions by Other Countries/ Organisations.

Various countries in North America, Europe etc. are manufacturing 120 mm Mortars mounted on AFV.

4. Deliverables.

120 mm Mortar system integrated on CMT.

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PROBLEM DEFINITION STATEMENT - 44

4TH/ 5TH GENERATION ANTI-TANK GUIDED MISSILE

1. What is the Problem (Need)?

Anti Tank Guided Missile (ATGM) is the principal anti-tank weapon system against armour threat in mechanized operations. Recent global conflicts have witnessed significant advancement in the armour and missile technology, which advocate an operational requirement of upgrading existing ATGMs.

2. Why it is Important to Solve?

Destruction of tanks of adversaries is a pre-requisite for a successful outcome of any tank-to-tank engagement in battlefield. Therefore, development of 4th/ 5th Generation ATGM becomes an operational imperative to fight future wars successfully.

3. Contemporary Solutions by Other Countries/ Organisations.

Advance variants of ATGM already developed by Israel, USA & Russia.

4. Deliverables.

The desired technology specifications of the 4th/ 5th Generation ATGM are as given below: -

(a) **Range.** 6 km.

(b) **Sighting System.** Integrated on Infantry Combat Vehicle of Mechanised Infantry.

(c) **Weight.** 20 - 25 kg.

(d) **Size.** 1 - 1.25 m.

(e) Minimum dual band seeker technology incorporated in ATGM.

(f) Inbuilt counter Active Protection System features with ATGM.

(g) Top Attack and Line of Sight modes.

(h) Lock on After Launch and Lock on Before Launch capability.

(j) Fire and Forget with Man in the Loop.

(k) Network Integrated with capability to be guided by third party.

(l) Multipurpose Tandem Warhead Preferred.

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PROBLEM DEFINITION STATEMENT – 45

HELICOPTER LAUNCHED LOITERING MUNITION

1. What is the Problem (Need)?

Helicopters have proved to be a versatile platform for targeting of enemy ground forces including Air Defence elements. Helicopter launched loitering munition can effectively enhance standoff ranges for engagement of targets. It entails development of loitering munition with foldable wings, suitably integrated with existing hard points on the Combat Helicopters, providing stand off ranges of minimum 30 km.

2. Why it is Important to Solve?

Helicopters offer a formidable platform to quickly transport loitering munition which can effectively neutralise targets, giving disproportionate results on the battlefield. The capability of a helicopter launched loitering munition would far exceed those of gun launched ammunition due to advantages of flexibility of application and higher ranges. It will also allow smaller number of Combat Helicopters to engage targets across the tactical battle area in lesser number of missions, thereby increasing the availability of platform for other tasks. Also, with reduction in vulnerability, the losses of this extremely critical and potent platform would be significantly reduced.

3. Contemporary Solutions by Other Countries/Organisations.

UVision has undertaken successful launch of its HERO-120 loitering munition from helicopter. Similarly, US firm Anduril Industries has developed ALTIUS-600 which can be launched from helicopters.

4. Deliverables.

Helicopter launched loitering munition with suitable launcher and its integration with existing Combat Helicopter platforms using existing hard points. The loitering munition should be capable of engaging enemy troops / vehicles including tanks at a minimum range of 30 km.

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PROBLEM DEFINITION STATEMENT – 46

MAN PORTABLE ANTI ARMOUR LOITER MUNITION

1. What is the Problem (Need)?

Anti-tank weapons are line of sight wpns which expose the firers to retaliatory fire and hence their efficiency is largely restricted to their first shot hit probability. The presence of a man portable anti armour loiter munition (LM) system will obviate the shortcomings of direct firing anti-tank weapons against mobile enemy columns with adequate protection against small arms ammunition fire besides increasing the engagement ranges exponentially.

2. Why it is Important to Solve?

The anti tank weapons have limited range and the line of sight requirement make the firer vulnerable to enemy retaliation. Engaging enemy armoured vehicles at standoff distance will be a great force multiplier for ground troops.

3. Contemporary Solutions by Other Countries/Organisations

Not known.

4. Deliverables.

10 sets of LM with six missiles for each set. One Man Portable Ground Control Station (MPGCS) and Ground Data Terminal (GDT) including simulator module on the MPGCS. The system should have spare batteries with one portable generator for charging. Capabilities desired for Anti Armour Loiter Munition should include the following:-

(a) Minimum Range of Aerial Platform – 15 Km.

(b) Minimum Range of Delivery of Ordnance – 4 Km from point of release.

(c) Hard Points for Carriage – Two to four.

(d) Operation Altitude – Up to 4500 m.

(e) Speed of UAV – Not less than 80 Kmph.

(f) Launch & Recovery – VTOL.

(g) Warhead - Tandem warhead with minimum 600 mm penetration beyond Explosive Reactive Armour.

(h) Target Acquisition – Dual Charged Coupled Device (CCD) & IR seeker with Lock on Before Launch (LOBL) capabilities (untethered operation).

(j) Weight - UAV (less missile) all up weight not more than 40 Kg (two missile system) and 60 Kg (4 missile system). Each missile not more than 15 Kg.

(k) Wind Tolerance – 25 Knots.

(l) Endurance – 60 min.

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PROBLEM DEFINITION STATEMENT – 47

FUEL AIR EXPLOSIVES TO BREACH MINEFIELDS

1. What is the Problem (Need)?

Minefields restrict maneuvre space, causes attrition, disrupts and delays own operations. Combat Engineers employ either manual or mechanical methods (Trawls & Ploughs) to breach safe lanes across minefields. An alternate & efficient means of using Fuel Air Explosives (FAE) needs to be developed to breach enemy minefields.

2. Why it is Important to Solve?

(a) The current methods of breaching are time consuming, resource intensive, vulnerable to enemy action & render mechanical minefield breaching hazardous due to influence mines, loiter munitions and anti-trawl measures being employed by the enemy.

(b) FAE will be time efficient & effective means to breach minefields especially in the present battlefield that is saturated with detection sensors, drones and loiter munitions.

3. Contemporary Solutions by Other Countries/Organisations.

Most of the countries still follow mechanical breaching means but certain countries like Israel have developed breaching capabilities using Fuel Air Explosive.

4. Deliverables.

FAE system should be able to breach an area of approx 300-500 metre in length and 4 - 6 metre in width by firing a salvo of 15-20 rockets. The rockets should be man portable, while the complete vehicle based system should be operated by a crew of 3 - 4 personnel.

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PROBLEM DEFINITION STATEMENT – 48

GROUND BASED TOP ATTACK ANTI TANK MINE

1. What is the Problem (Need)?

Traditional ground based mines are primarily pressure/ magnetic signature activated targeting the tank tracks or tank belly and their laying is a resource & time intensive task. Further, the design of armoured vehicles and new breaching measures have made them less effective. Top attack anti-tank mines provides the advantage of smart detection, assured hit on the softest part of armoured vehicle and require less effort & resources to deploy in the face of tank columns, thereby saving on major mine field laying efforts.

2. Why is it Important to Solve?

Developing top attack anti tank mine will increase the probability of achieving assured hit on a real time basis. As also, lesser number of mines will cover large areas.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **Russia**. PTKM-1 is a top attack anti-tank mine that functions by detecting & tracking a target through acoustic & seismic sensor.

(b) **USA**. XM 204 mine of USA is designed to autonomously detect, track & engage heavy & light tracked vehicles.

4. Deliverable.

Key features of mine are as under:-

(a) Integrate sensors like infrared, seismic, acoustic or magnetic to detect, track and target modern armoured vehicles.

(b) Capable of distinguishing between soft skinned vehicles and armoured vehicles using sensor and AI algorithms.

(c) Employ shaped charges or kinetic projectiles to attack the top of the tank.

(d) Once armoured vehicle is detected suitable activation mechanism and guidance means to achieve top attack kill. The mine should be suitable for deployment in varied terrain to include deserts and High Altitude Area.

(e) Remote control activation and deactivation capabilities are crucial, ensuring that these mines can be deployed and activated in dynamic combat environments.

(f) Should be man portable, easy to activate by a single soldier, have anti handling measures and have the capacity to remain activated for 15-20 days. Also, have the provision for change of power source to enable longer deployment.

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FIRE CONTROL SYSTEM/ SIGHTING SYSTEM

PROBLEM DEFINITION STATEMENT – 49

NIGHT SIGHT FOR DIRECT FIRING & DIDF BY ARTILLERY GUNS

1. What is the Problem (Need)?

(a) Direct firing & Direct-Indirect Firing (DIDF) entail the gunner aligning the barrel of the gun by looking through the direct firing sight / dial sight. Accuracy of fire is heavily dependent on the visibility through the sight. Hence, it is imperative that the gunner has clear visibility during both day & night to ensure accurate fire.

(b) Night fighting capability of enemy armoured vehicles makes it imperative for the artillery guns to have night sights for engagement through direct firing. Similarly, DIDF engagements also require night sights for effective firing during night.

2. Contemporary Solutions by Other Countries/Organisations.

CM3LR sight developed by Safran is being used on a number of gun systems across the world.

3. Deliverables.

Direct Firing Night Sight including suitable mounting arrangements for 155 mm Soltam, 155 mm Sharang, 130 mm Towed Gun and 105mm Indian/ Light Field Gun Systems. The sight should have suitable markings compatible with existing charge system and facilitate engagement of targets up to minimum range of 5 km.

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PROBLEM DEFINITION STATEMENT – 50

DIGITAL DAY SIGHT FOR 7.62MM MMG

1. What is the Problem (Need)?

The 7.62 mm Medium Machine Gun (MMG) Sighting System is based on open sight for direct fire. With no provision of optical zooming in open sight, the scope of human error increases at longer ranges. As military operations have evolved to require greater precision and efficiency, the limitations of open sights have become increasingly apparent, necessitating the development of a digital day sight for the in service 7.62 mm MMG.

2. Why it is Important to Solve?

The present sighting system does not fully exploit the potential of the 7.62 mm MMG. Factors such as adverse weather conditions, human error and delays in preparation time have highlighted the need for a more advanced solution that can overcome the challenges and enhance the effectiveness of MMG dets on the battlefield.

3. Contemporary Solutions by Other Countries/Organisations.

(a) C79 by M/s Elcan, USA.

(b) TA648 6x48 by M/s Trijicon, USA.

(c) DCLI 10 by M/s DI Optical, South Korea.

4. Deliverables.

(a) **Magnification.** Variable zoom capability with minimum 5 x to 15x.

(b) **Ballistic Computer.** To compute the range of the target alongwith corrections for wind and altitude.

(c) **Bullet Drop Compensator.** To be provided in tandem with ballistic computer upto a range of 2500 m.

(d) **Calibration**. In mils.

(e) **Ruggedness.** The digital sight should be able to withstand harsh environmental conditions such as extreme temperature, humidity and dust. Withstand shocks and vibrations encountered during transportation and operational use.

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PROBLEM DEFINITION STATEMENT – 51

FIRE ASSISTANCE SYSTEM FOR ASSAULT RIFLE

1. What is the Problem (Need)?

In modern day battlefield environment, there is limited window of opportunity for acquiring and effectively engaging the target. Acquisition of target by firer is also affected by various factors such as reduced visibility and fatigue. Therefore, there is a need to provide assistance to individual firer to enhance accuracy and efficiency of the solider in a given window of opportunity.

2. Why it is Important to Solve?

Fire Assistance System (FAS) for assault rifle will enhance accuracy and quick engagement by providing assistance to individual firer. It will accurately engage the target and in turn reduce requirement of ammunition and collateral damage.

3. Contemporary Solutions by Other Countries/Organisations.

ARAD Arbel System of Israel.

4. Deliverables.

FAS for Assault Rifle with following capabilities:-

(a) Target identification and tracking capability for engagement of target at effective range of in-service Assault Rifle.

(b) FAS should not render the weapon system & the sighting system ineffective for employment. The weapon system should be made adaptable with FAS in a manner that it can be used effectively with or without the FAS.

(c) Capability to engage static and moving target both during day and night.

(d) Should be compatible with 'in-service' Assault Rifles without any major modification or design changes impacting performance of the weapon.

(e) FAS should have the capability to incorporate individual firer variable to include physical and psychological behavior i.e. physical move, heavy breathing, battle fatigue, recoil and allowing the soldier to effectively neutralize the target quickly and efficiently.

(f) Should be able to operate in harsh environment conditions such as extreme temperature (minus 30° C to plus 50° C), humidity and dust.

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PROBLEM DEFINITION STATEMENT – 52

FIRE CONTROL SYSTEM FOR SNIPER RIFLE

1. What is the Problem (Need)?

In the present battlefield environment, the emphasis on single shot kill probability and increased percentage of hit by sniper detachment is crucial to neutralise high value targets with minimum exposure to crew. Presently, the mission success depends upon skill and training of the firer which is vulnerable to cognitive load, human error or dynamic environment condition which may result in failure of mission. In order to achieve first round hit probability of high value target, which may present itself for a very short time, snipers have to be technologically enabled in modern battlefield. Development of ruggedized Fire Control System (FCS) for Sniper Rifle will vastly enhance the accuracy and lethality of the sniper detachment.

2. Why it is Important to Solve?

FCS for sniper rifle will provide pinpoint accuracy, thereby increasing first hit probability. FCS will also reduce collateral damage.

3. Contemporary Solutions by Other Countries/Organisations.

XM 157 NGSW-FC by Vortex Optics, USA & SMASH FCS by M/s Smart Shooter Ltd, Israel.

4. Deliverables.

FCS for Sniper Rifle should be light weight, capable of calculating environmental conditions including distance, wind speed and other factors autonomously and project aiming point on sight mounted on weapon or helmet mounted goggles/ display, allowing the crew to hit the target quickly and effectively. It should have day and night target acquisition capability with power management system and should be able to operate in extreme temperatures ranging from minus 30° C to plus 50° C and adverse weather conditions.

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MOBILITY

PROBLEM DEFINITION STATEMENT – 53

MANPACK MODULAR CROSSING EXPEDIENTS FOR MOUNTAINS

1. What is the Problem (Need)?

Indian Army operating in mountainous region frequently encounter fast flowing rivers and streams that impede troop movement and logistics. Traditional river crossing solutions, such as building temporary bridges are often impractical due to the remote rugged terrain and time consuming nature of these methods. This delay can severely hinder troops' mobility, restrict access to critical locations and leave infantry vulnerable to enemy forces or natural hazards while waiting for suitable crossing opportunities. Hence, there is a need for manpack modular bridging system for mountains.

2. Why it is Important to Solve?

Portable crossing expedients will enable military units to quickly and safely cross rivers or streams in mountainous regions where traditional bridges or vehicles cannot be used. Their modular design will allow for easy transportation by individuals facilitating rapid deployment and assembly in remote or difficult-to-access locations. This adaptability is also vital for emergency situations such as search and rescue missions or disaster relief operations where swift and efficient crossing solutions can save lives and improve response times.

3. Contemporary Solutions by Other Countries/Organisations.

Easi Bridge of UK.

4. Deliverables.

(a) One set of modular crossing expedient should cover a span of 25 to 50 meters.

(b) One complete module of every three to five meters span should be carried manpack by one person in a compact foldable configuration.

(c) Scalable design with lightweight and high-strength frame.

(d) Quick connect/ disconnect mechanism.

(e) Should include battery operated directional LED beacons for ease of use during night.

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PROBLEM DEFINITION STATEMENT – 54

TRACKED VEHICLE BASED MULTI SPAN ASSAULT BRIDGE (75-100M)

1. What is the Problem (Need)?

(a) High Mobility Vehicle (HMV) based multi span assault bridges play an important role towards induction of own forces across obstacle systems of canals, rivers & ditches. Currently, HMV based multi span assault bridges such as AM-50 & Sarvatra Bridge System are being employed to bridge large gaps. However, HMV based multi span assault bridging systems are vulnerable to mines and lack matching mobility with armoured formation.

(b) In a time sensitive tactical environment, complex launch drills & extended bridge launching time creates operational challenges. Tracked Vehicle based Multi Span Assault Bridge System covering gaps (75-100 metre) for load class 70 will help mitigate existing challenges.

2. Why it is Important to Solve?

(a) Mitigate existing challenges of complex launch/ delaunch procedures and vulnerabilities to mines and explosives so that gaps/ obstacles can be bridged in a tactically acceptable timeframe so as to ensure that momentum of advancing force is maintained.

(b) To have an equipment that has matching cross country mobility with advancing mechanized forces.

3. Contemporary Solutions by Other Countries/Organisations.

Various countries like USA, Russia, UK, Germany etc are employing Armoured Vehicle Launch Bridge having spans upto 20-25 metre.

4. Deliverables.

Design & develop Armoured Vehicle Based Multi Span Assault Bridge System having u/m capabilities:-

(a) Bridging system to be based on T-72/T-90 chassis.

(b) Single span (15-20 metre) mounted on one armoured vehicle & Multi Span (75-100 metre) mounted on 4 - 5 armoured vehicles.

(c) Width of Bridge - 4 metre.

(d) Load Class 70.

(e) Cover depth of obstacle from 1 to 6 metre.

(f) Electro-hydraulic operating system for bridge launch.

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MOBILITY

PROBLEM DEFINITION STATEMENT – 55

SELF PROPELLED OR HMV BASED FLOATING BRIDGE SYSTEM (INDIGENOUS)

1. What is the Problem (Need)?

PMS is a Pontoon bridge system that plays a crucial role in military operations across riverine terrain. High Mobility Vehicle (HMV) based Pontoon bridge system is being used for constructing floating bridges and rafts across rivers. PMS Bridge System is of vintage origin and its maintenance & serviceability is likely to become a challenge in future. An indigenous HMV based Floating Bridge System needs to be designed & developed to replace existing PMS Bridge System.

2. Why it is Important to Solve?

PMS Bridge System plays a crucial role in military operation across water obstacles especially rivers. Due to its vintage, wear & tear the operational reliability of PMS Bridge System may become a challenge in the future.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **USA.** Improved Ribbon Bridge, a floating bridge system similar to PMS Bridge System.

(b) **France.** PFM Pontoon Bridge System is a motorised system for crossing wet gaps by use of Assault Rafts or a Bridge up to class MLC 90T.

(c) **Germany.** M3 Amphibious Bridge & Ferrying System is a self-propelled amphibious bridging & ferrying vehicle that has load classification of MLC 85T.

4. Deliverables.

Self-propelled or HMV based Floating Bridge System capable of replacing PMS Bridge System (bridge upto 300 metre of load class 70) with similar/ improved capabilities.

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PROBLEM DEFINITION STATEMENT – 56

MOTOR TUG LAUNCH (INDIGENOUS)

1. What is the Problem (Need)?

Pontoon based PMS bridge system includes the bridge section (pontoon), vehicle section and the Motor Tug Launch (MTL) as the boat section. MTL is a critical equipment for PMS Bridge and plays a significant role in ferrying of pontoons during bridge construction, holding the bridge along the centre line and is used for ferrying of pontoon rafts. The MTLs are of vintage origin and their serviceability is likely to become a challenge in the future.

2. Why it is Important to Solve?

PMS bridge system plays a crucial role in military operations across riverine terrain. MTL as part of PMS bridging system is a critical equipment utilized for construction of PMS Bridge. However, there is a need to induct an indigenous MTL to replace the existing equipment of vintage origin.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

Indigenous MTL for existing PMS bridge should be able to operate in water having 6 - 8 knot current & have engine power higher than 200 HP. The MTL should be designed to be towed, carried on an HMV & hydraulically launched from an HMV.

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PROBLEM DEFINITION STATEMENT – 57

TYRE TECHNOLOGY FOR AUTOMATIC SNOW CHAINS

1. What is the Problem (Need)?

Indian Army is deployed in areas which are snow bound. This necessitates regular movement of men & material in High Altitude Areas (HAA), where roads are covered with snow. Presently, the drivers fit & remove traditional snow chains on the tyres manually, which is a cumbersome and time consuming process. This, at times, deters drivers from using them, thereby resulting in vehicle accidents in snow bound areas.

2. Why it is Important to Solve?

Units deployed in HAA in field conditions are maximum affected, since move is required to be undertaken on roads & tracks covered with snow. All these locations are operationally active, and therefore a solution would enhance the operational efficiency and also prevent vehicle accidents due to poor traction.

3. Contemporary Solutions by Other Countries/Organisations.

Some countries like Russia have developed solutions, where spikes are used to enhance traction of vehicles in snow.

4. Deliverables.

A suitable solution which results in mitigation of requirement of manually tying of snow chains to tyres of military vehicles plying on snow covered roads & tracks.

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SURVIVABILITY/ INDIVIDUAL CAPABILITY ENHANCEMENT

PROBLEM DEFINITION STATEMENT – 58

PRECISION AERIAL DELIVERY SYSTEM (PADS)

1. What is the Problem (Need)?

Unmanned Autonomous Precision Aerial Delivery System is essential for conduct of special mission operation & ensure sustenance of forces for longer duration during conflict. The system is based on steerable parachutes with a guidance unit and platform for carriage of loads of 4 Tons, 500 & 200 Kgs capacity.

2. Why it is Important to Solve?

Developing indigenous PADS will result in secure equipment being readily available with airborne units for employment and training needs.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **Canada.** Sherpa System.

(b) **USA.** GPADS, JPADS, SCREAMER, AGAS, Atair ONYX.

(c) **Netherlands.** SPADES System.

4. Deliverables.

The precision aerial delivery system developed should have undermentioned deliverable:-

(a) Capabilities to be dropped from altitude upto 7000 m.

(b) Systems for loads upto 4 Ton, 500 Kg & 200 Kg.

(c) Steerable parachute, Guidance Unit & Platform for Loads.

(d) Delivery of loads with accuracy upto 10 m on landing.

(e) Compatible with all types of GNSS systems including NAVIC, allowing user to select/ deselect desired system.

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PROBLEM DEFINITION STATEMENT – 59

SOLUTION TO PREVENT FREEZING OF WATER AT HIGH ALTITUDE AREAS

1. What is the Problem (Need)?

In mountainous terrain and high altitude areas where sub-zero temperatures are experienced, water freezes in the pipelines and water tanks. Thus, making it very difficult for immediate utilisation of water by the soldiers deployed at such places, till the water is heated up.

2. Why is it Important to Solve?

Water stored in tanks or already in pipelines, freezes due to sub-zero temperatures making it difficult to be utilised by the troops for any immediate purpose. Considerable effort in terms of heating is carried out utilizing large amount of fuel. Hence, solution to prevent freezing of water (may be in the form of additives which can prevent water from freezing and yet potable) in pipelines and storage equipment be developed.

3. Contemporary Solutions by Other Countries/Organisations.

Scandinavian Countries and Arctic/ Antarctica permanent Base Stations.

4. Deliverable.

(a) Solution should be able to operate in temperatures ranging up to minus 30 degree celsius.

(b) Should be easy to install and operate and should not require electricity to operate.

(c) Should not render the water unfit for drinking purposes.

(d) Should be a single system that can also be employed on existing system of pipelines & water tanks.

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PROBLEM DEFINITION STATEMENT – 60

CHEMICAL SOIL STABILISATION

1. What is the Problem (Need)?

Preparation of helipads/ air strips under varied terrain conditions including deserts, remote locations in mountains and boggy areas/ banks close to water bodies requires soil stabilisation. Soil stabilisation is a key challenge for executing operational tasks such as track laying, construction of helipads, airstrips/ landing areas etc. These tasks are required to be executed in tactically acceptable timeframe.

2. Why is it Important to Solve?

Successful chemical soil stabilisation would help optimize time and resources for execution of various tasks under operational conditions.

3. Contemporary Solutions by Other Countries/Organizations.

Solutions have been attempted using chemicals such as Calcium Chloride, Sodium Silicate etc.

4. Deliverable.

(a) Manportable dispenser filled with suitable chemical which can be employed for spraying chemicals for rapid soil stabilization by a single person.

(b) Chemical soil stabilization should become effective within 20 - 30 minutes from application.

(c) Chemical should be non hazardous, easy & safe to store and use.

(d) Provision for quick refilling of dispensers in field conditions.

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PROBLEM DEFINITION STATEMENT – 61

BULLET PROOF VEST FOR MILITARY WORKING DOGS

1. What is the Problem (Need)?

Enhanced use of Military Working Dogs (MWDs) with better training have yielded excellent operational results. MWDs are now increasingly being used in various Counter Insurgency/Counter Terrorism Operations and along the Line of Control. Due to the nature of deployment, these MWDs are exposed to fatal/ non-fatal injuries due to Gun Shot Wounds (GSWs) and/or splinter injuries owing to lack of protective gear. Presently, imported vests which are heavy, costly and providing limited protection are being used.

2. Why it is Important to Solve?

To reduce fatal/ non-fatal injuries in MWDs through indigenous bullet proof vests.

3. Contemporary Solutions by Other Countries/Organisations.

Bullet proof vests and other protective gears are being extensively used by few countries like Israel & USA.

4. Deliverables.

Light Weight Bullet Proof Vest (less than 2 Kgs) for MWDs for protection against gun shots and splinters.

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LOGISTICS & MAINTENANCE

PROBLEM DEFINITION STATEMENT – 62

UNIVERSAL GEARBOX TESTING FACILITY

1. What is the Problem (Need)?

Presently, there is no provision to check serviceability of Gearbox Assembly especially for ex import vehicles like Zil-131 Maintenance Lorry and Engineer equipment, during overhaul at Base Workshops. Due to non availability of Gearbox testing facility, manual methods are being resorted to, which are unreliable and inaccurate. This complicates the testing process affecting the reliability and necessitating the requirement of a universal gearbox testing facility which can help in carrying out testing of all types of gearbox assemblies, thereby increasing the reliability of the testing procedures.

2. Why it is Important to Solve?

To enhance quality & reliability of Gearbox Assembly, there is a requirement to develop a fully automated gearbox test mechanism.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

Fully automated Universal Gearbox testing facility for Zil – 131 and Engineer Equipment to monitor the following vital parameters: -

(a) Bearing temperature.

(b) Revolution per minute.

(c) Absolute & relative vibration.

(d) Noise.

(e) Oil pressure, oil flow & oil temperature.

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PROBLEM DEFINITION STATEMENT – 63

UNIVERSAL TEST JIG FOR ASSEMBLIES OF TATRA VEHICLE

1. What is the Problem (Need)?

Tatra vehicles are currently being employed by Indian Army in harsh terrain and weather conditions. Thus, it becomes imperative to ensure the reliability of all assemblies as per Base Inspection Standard before and after being repaired/ reclaimed during the base overhaul activity. Presently, Tatra 6x6 and 8x8 vehicles are being overhauled at Army Base Workshop to enhance the residual life. There is a need to develop a universal test jig for testing various assemblies & systems of Tatra vehicles.

2. Why it is Important to Solve?

To enhance the quality of testing various assemblies/system of Tatra, it is important to develop a versatile Universal Test Jig wherein all hydraulic or pneumatic assemblies, irrespective of ratings, can be tested.

3. Contemporary Solutions by Other Countries/ Organisations.

Not known.

4. Deliverables.

Universal test jig for testing various assemblies/sub-assemblies of hydraulic & pneumatic systems, to include drive train, steering system, brake system, gear actuation etc of Tatra vehicles.

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PROBLEM DEFINITION STATEMENT – 64

HEALTH MONITORING & PREDICTIVE MAINTENANCE OF AFVs USING BIG DATA ANALYTICS

1. What is the Problem (Need)?

Armoured Fighting Vehicles' (AFVs) systems & subsystems are complex both in hardware and software. These cannot be monitored visually due to their complicated layout, thus impeding preventive maintenance. Maintenance strategy being used in Army is therefore reactive, which results in reduction of lifetime of vehicle, reduces its availability and premature loss of equipment. Predictive maintenance is required to overcome these issues by real time diagnosis.

2. Why it is Important to Solve?

Using Big Data analytics, by constant health monitoring of AFVs & data collection, preventive/predictive maintenance can be carried out. This in turn would facilitate enhanced AFV availability while optimising on financial expenditure incurred on corrective maintenance. It can also assist in modification and upgradation of AFVs as per requirements.

3. Contemporary Solutions by Other Countries/Organisations.

(a) **USA.** TEDANN (Turbine Engine Diagnostics using Artificial Neural Networks), a vehicle health check system to assess battle readiness in real-time, with an on-board computer system which continuously monitors the health of tank subsystems.

(b) **South Korea.** Hyundai Blue link program AI based technology enables an easy flow of critical information between the individual and his car.

4. Deliverables.

AFV health monitoring & predictive maintenance software system.

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PROBLEM DEFINITION STATEMENT – 65

ADVANCED CANOPY FOR LORRY 5/7.5 TON ALS

1. What is the Problem (Need)?

Existing canopy of Lorry 5/7.5 Ton Ashok Leyland Stallion (ALS) held with the Indian Army is facing various issues such as inadequate weather resistance, insufficient insulation and high maintenance requirement. The existing canopy is also relatively heavy and has shorter lifespan, especially in areas of harsh weather and high-humidity environment. All these aspects affect the performance of the vehicle as well as its operational efficiency.

2. Why is it Important to Solve?

(a) To avoid frequent wear & tear of the canopies and deterioration of vehicle body.

(b) Added weight and potential aerodynamic drag of existing tarpaulin affects the vehicle performance and fuel consumption.

3. Contemporary Solutions by other Countries/ Organisations.

Some advanced canopies incorporate climate control systems to maintain optimal conditions inside the truck for sensitive cargo or equipment. Countries like Germany and USA use advanced materials for canopies that are weather-resistant, including high-grade plastics, fiber glass and aluminum. These materials are designed to endure harsh conditions and provide long-term durability.

4. Deliverables.

Replacement of the existing canopy with a durable, waterproof, weather resistant and low maintenance canopy. It should be made of light weight fiber body/suitable material. The canopy should consist of grooves to allow it to be pushed backwards and also upwards, thus facilitating provision of additional space, which will help in better management & protection of ration supplies/ equipment.

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PROBLEM DEFINITION STATEMENT – 66

NEW GENERATION FUEL BARRELS (200 LITRES)

1. What is the Problem (Need)?

FOL management is a crucial aspect of logistic support provided to field formations. Storage and transportation of FOL is done in barrels. The barrels used in Indian Army are Grade 'A' Type-2 of 200 litres capacity, made up of mild steel. The existing barrels, though robust, are prone to rusting, heavy and cumbersome to handle. In addition, they take large storage space even when empty. The greatest challenge is storage of main grade fuels in High Altitude Areas (HAA)/ mountainous terrain where existing barrels cannot be transported through heli-lift. There is a need to develop a customised alternate solution for Indian Army in form of new generation fuel barrels.

2. Why it is Important to Solve?

To enable ease of transportation, handling and portability of fuel in pack storage, especially in remote locations/HAA.

3. Contemporary Solution by Other Countries / Organisations.

Countries like USA & UK are using GTA drums and Double Drum Containers which are fuel drums specially designed for ease of portability and heli-lifting as slung load.

4. Deliverables.

Robust, lightweight, portable, fire resistant and foldable/ collapsible fuel drums which occupy lesser space when empty. The barrels should be easy to handle, and be able to withstand extremes of temperatures. The barrels should be durable as it would be subjected to multiple handling. The broad qualitative requirements and specifications guidelines have been enumerated below:-

(a) **Qualitative Requirements.**

(i) Should be resistant to rusting and thus should not cause any contamination to the product stored in it.

(ii) Should facilitate easy loading/ shifting being light weight.

(iii) Material used should be resistant to scratches and dents due to loading/ unloading. It should be easily transported by vehicles, helicopters and aircrafts.

(iv) Material used should be suitable for storage of fuels like gasoline, diesel, jet fuel/ATF and kerosene.

(v) Suitable for storage in stacks on pallets for multitier stacking. Multitier stacking should not result in buckling.

(vi) Should be able to withstand drops from higher levels and pass drop test of 1.8 meter. It should also pass other tests like leakage test, hydraulic pressure test etc.

(vii) Should be able to withstand extreme temperatures ranging from minus 45°C to plus 50°C and should provide durability as it would be subjected to multiple handling.

(viii) Bungs/ closures should be sturdy and seals shall not tend to break.

(b) **Specification Guidelines.** Some basic requirements for reference are as under:-

(i) **Seam Construction.** In case of metal constructed storage alternatives, the top and bottom ends shall be seamed to the body. The sealing compound forming the core shall be flexible and chemically resistant to the product to be packed.

(ii) **Closures.** The drums shall be fitted with screwed closure of 50mm.

(iii) **Finish.** The drum shall be in clean condition, the inside being free from all traces of rust and foreign matter.

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PROBLEM DEFINITION STATEMENT – 67

CONTAINER FOR LOCAL DEMOLITION OF UNSERVICEABLE EXPLOSIVES/ UXO

1. What is the Problem (Need)?

Indian Army carries out disposal by demolition of Overage/Expired/Unserviceable Ammunition and Unserviceable Explosives/ Unexploded Explosives (UXO) yearly. These demolitions expose the service personnel to risks of getting injured while carrying them out. At present only up to 7 kg NEC is allowed to be demolished in the local demolition ground. Moreover, there are very few notified ranges which imposes time delay & restriction on the disposal activities. Therefore, there is a requirement of containerised demolition of up to 10 kg NEC explosives within the premises of depot.

2. Why it is Important to Solve?

(a) **Safety.** Ammunition by nature is dangerous & a safety hazard, if mishandled. A container that is specifically designed for the local demolition of unserviceable ammunition providing a safe and controlled environment for disposal process.

(b) **Compliance.** Disposal of unserviceable ammunition is governed by strict regulations to ensure that it is done in a safe and environmentally responsible manner.

(c) **Efficiency.** A dedicated container provides convenient and efficient way for disposal of ammunition.

3. Contemporary Solutions by Other Countries/Organisations.

Closed detonation using detonation chamber are being utilised worldwide. Some of the systems being utilised are enumerated below:-

(a) Controlled Detonation Chamber (CDC) which includes models like D-100 & D-200 are being utilised at Milan Army Ammunition Centre Plant, Tennessee and Crane Naval Surface Warfare Activity in Indiana, USA.

(b) Explosive Destruction System (EDS) used by US Army's Recovered Chemical Munitions Directorate & built by Sandia National Laboratory.

(c) Detonation of Ammunition in a Vacuum Integrated Chamber (DAVINCH) is a CDC that has been developed by the Japanese firm Kobe Steel.

4. Deliverables

Container for Local Demolition of Unserviceable Explosives/ UXO up to 10 kg NEC.

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PROBLEM DEFINITION STATEMENT – 68

DIRECT ENERGY DEPOSITION TECHNOLOGY FOR RECLAMATION OF SPARES

1. What is the Problem (Need)?

Due to tenuous supply chains and current geo-political situation, there is a need for indigenous and responsive supply of spares for important armament systems such as 155mm Bofors, 130mm Medium Gun and Soltam Guns. It impacts the quality of repairs, reliability of the Gun System and also reduces the turnaround time for repairs, thus ensuring higher serviceability of the gun system.

2. Why it is Important to Solve?

Directed Energy Deposition is one of the modern trends in reclamation technology and manufacturing processes. This technology, if integrated with a high precision Computerised Numerical Control (CNC) machine, can provide disproportionate results and can be a game changer to overcome criticality of spares not available through existing supply chains.

3. Contemporary Solutions by Other Countries/ Organisations.

Directed Energy Deposition Technology is currently being used in RR CAMS Indore, IITs and few industries in India.

4. Deliverables.

System for reclamation of spares/components of Gun System not subjected to recoil impact, by using direct energy deposition technology.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 69

MEMS GYROSCOPES FOR ARMOURED FIGHTING VEHICLES

1. What is the Problem (Need)?

Stability of the gun on an Armoured Fighting Vehicle (AFV) is an important aspect to ensure accuracy of firing by reducing movement of gun system from target while on the move. Gyroscopes are primary component of gun control system to ensure the stability and accuracy of the system. Hence, there is a need for development of Micro Electronic Mechanical System (MEMS) based Gyroscopes or using any other latest technology for AFVs to replace the existing mechanical gyroscopes with upgraded capabilities in fire control system of AFVs.

2. Why it is Important to Solve?

Gyroscopes play a pivotal role in the enhancement of combat capabilities of AFVs by ensuring effective firepower in dynamic battlefield conditions and achieving stabilization as well as fire control with enhanced accuracy. Mechanical Gyroscopes fitted in AFVs affect the sustenance issues besides being less accurate compared to contemporary technology in the field of gyroscopes already existing globally.

3. Contemporary Solutions by Other Countries/ Organisations.

Major global military powers such as USA, China and Israel are using Fiber Optic Gyroscopes (FOG) and MEMS Gyroscopes successfully in their current AFVs.

4. Deliverables.

Compact size Micro Electronic Mechanical Systems (MEMS) Gyroscopes for own AFVs (T-72 & T-90).

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 70

SINGLE MODULE RADAR AND RADAR SIGNAL PROCESSOR CARDS

1. What is the Problem (Need)?

Single Module Radar (SMR) Card and Radar Signal Processor (RSP) Card are components of the radar assembly of upgraded Schilka Weapon System. SMR card generates Radio Frequency beam forming, signal reception and undertakes processing. RSP card facilitates signal processing and antenna hardware control. The radar antenna assembly of each upgraded Schilka Weapon System has four SMR Cards and one RSP card. Both cards are ex-import and are critical for functioning of the radar assembly. Due to dependence on foreign vendors, the turnaround time for repairs is prolonged. To improve the serviceability of the antenna assembly of upgraded Schilka Weapon System, an indigenous solution is required.

2. Why it is Important to Solve?

SMR and RSP Cards in radar assembly of upgraded Schilka Weapon System are ex-import having restricted availability which increases the time required for repair or replacement. An indigenous solution will facilitate in reducing downtime and increase maintainability.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

(a) Indigenised SMR and RSP cards are to be produced, to improve the serviceability state of upgraded Schilka Weapon System and reduce dependency on Foreign OEM.

(b) These must be compatible in form factor and provide similar or superior performance to those being currently utilised.

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PROBLEM DEFINITION STATEMENT – 71

INDIGENOUS RECOIL PISTON ROD OF 130MM M-46 TOWED GUN SYSTEM

1. What is the Problem (Need)?

The recoil system of 130mm M-46 Gun is the most critical sub system, designed to absorb the kinetic energy of the gun recoiling parts during firing, return the gun recoiling parts to initial position after firing and hold the recoiling parts in place at any elevation during firing thereby ensuring stability and safety of the gun. However, due to vintage and extensive usage, the recoil piston rods have started to develop pitting towards breech end of the gun, necessitating replacement.

2. Why it is Important to Solve?

A large number of Recoil Piston Rods are found to have been damaged due to corrosion with light to deep scratches and pitting which needs replacement to ensure reliability of Gun System.

3. Contemporary Solutions by Other Countries/ Organisations.

Recoil piston rods are available in the international market, however indigenous solution is sought.

4. Deliverables.

Indigenous Recoil Piston Rod for 130mm M-46 Towed Gun System.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 72

ELECTRO OPTICAL FIRE CONTROL SYSTEM FOR 40MM L-70 GUNS

1. What is the Problem (Need)?

As part of upgradation of L-70 Gun, Electro Optical Fire Control Systems (EOFCS), consisting of Laser Range Finder (LRF), Charge Couple Device (CCD) & Thermal Imager (TI), were fitted to enhance its potential in engaging targets in Local Power Mode. EOFCS currently fitted on the upgraded guns were procured ex-import and are prone to frequent faults. Certain components of the EOFCS are of foreign origin, due to which the fault diagnosis and repair capability within the Army is restricted, resulting in prolonged unserviceability of the equipment. Indigenisation of the EOFCS will enable self-reliance, improve the serviceability state and facilitate maintenance of the equipment.

2. Why it is Important to Solve?

Indigenisation of EOFCS system for upgraded 40mm L-70 guns will reduce dependence on Foreign OEM for fault diagnosis, repairs and spare parts, thereby reducing the turnaround time for repairs.

3. Contemporary Solutions by Other Countries/Organisations.

Not known.

4. Deliverables.

(a) An indigenous EOFCS system, consisting of LRF, CCD & TI, is required to be developed compatible with 40mm L-70 Guns.

(b) Technical specifications of EOFCS should be similar or higher than the current EOFCS fitted on the upgraded L-70 guns.

(c) No foreign based software or hardware, to avoid dependency on Foreign OEM.

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IMPORT SUBSTITUTION/INDIGENISATION

PROBLEM DEFINITION STATEMENT – 73

MIRROR UNIT OF THERMAL IMAGER SIGHT OF TANK T-90

1. What is the Problem (Need)?

Due to faults in ex import components such as MED 1 & MED 5 (Magnetic Motors) or Gyroscopic Stabilizer, the Mirror Unit of Thermal Imager ESSA is rendered unserviceable, making the tank night blind. The critical spares such as MED 1, MED 5 Motors/ gyroscope, are most fault prone and in short supply, leading to large turnaround time for repairs. Thus, there is a need to indigenise these components of Mirror unit of the TI Sight.

2. Why it is Important to Solve?

It is important to ensure the night fighting capability of tanks.

3. Contemporary Solutions by Other Countries/Organisations.

Foreign OEM is the only source for providing spares presently.

4. Deliverables.

Indigenisation of MED 1 & MED 5 (Magnetic Motors) and Gyroscopic Stabilizer of Mirror Unit, to mitigate the dependency on ex-import spares.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 74

RADIATOR BLOCK OF RANGE FINDER UNIT OF TANK T-90

1. What is the Problem (Need)?

Radiator block is part of Range Finder (RF) module of Main Gunner Sight 1G46 of Tank T-90 and is utilised for generation of Laser for estimating the range to the target. As per OEM Process Documents, for undertaking repairs of the subject assembly, the complete assembly is required to be replaced. Laser Rod and Flash lamp are critical sub parts of Radiator block and are expensive being ex import. There is a need to indigenise the Radiator Block Assembly including Laser Rod & Flash Lamp.

2. Why it is Important to Solve?

Increase in turnaround time of this war like equipment, due to non-availability of Radiator Block modules and critical spares of Radiator block like Laser Rod & Flash Lamp adversely affects operational efficiency of formations.

3. Contemporary Solutions by Other Countries/Organisations.

Foreign OEM is the only source for providing spares presently.

4. Deliverables.

Indigenisation of Radiator block of Range Finder Unit (Tank T-90) Assembly including Laser Rod & Flash Lamp, to mitigate the dependency on ex-import spares.

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IMPORT SUBSTITUTION/INDIGENISATION

PROBLEM DEFINITION STATEMENT – 75

CONTROL CARD OF GUNNER CONTROL UNIT FOR UPGRADED TISAS OF TANK T-72

1. What is the Problem (Need)?

Control Card is installed in the front panel of Gunner Control Unit (GCU) of Thermal Imager Stand Alone System Upgraded (TISAS) (U) as part of the hardware that supports the Man Machine Interface (MMI) functions achieved by the front panel. Control Card of GCU is the most fault prone sub assembly. Presently, the complete equipment including sub-assemblies are ex import, leading to delay in repairs. There is an urgent need to indigenise the Control Card of GCU.

2. Why it is Important to Solve?

Increase in turnaround time of this war like equipment, due to delay in spares provisioning from Foreign OEM, affects the availability of equipment to the Field Army.

3. Contemporary Solutions by Other Countries/Organisations.

Foreign OEM is the only source for providing spares presently.

4. Deliverables.

Indigenisation of Control Card of GCU for upgraded Thermal Imager Stand Alone System of Tank T-72, to mitigate the dependency on ex-import spares.

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PROBLEM DEFINITION STATEMENT – 76

MAIN BOARD CIRCUIT CARD ASSEMBLY OF THERMAL IMAGER ATGM

1. What is the Problem (Need)?

Main Board Circuit Card Assembly (CCA) is the main and most fault prone PCB in Thermal Imager (TI) for Anti-Tank Guided Missile (ATGM). In case the Main Board CCA is faulty, it renders the TI ATGM unserviceable. The cost of replacement of one Main Board CCA is very high. The complete equipment is ex-import and leads to delay in repairs. There is an urgent need to indigenise the Main Board CCA.

2. Why it is Important to Solve?

Increase in turnaround time of this war like equipment, due to delay in provisioning of spares from Foreign OEM, affects the availability of equipment to the Field Army.

3. Contemporary Solutions by Other Countries/Organisations.

Foreign OEM is the only source for providing spares presently.

4. Deliverables.

Indigenisation of Main Board CCA of TI ATGM, to mitigate the dependency on ex-import spares.

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PROBLEM DEFINITION STATEMENT – 77

CANT ANGLE SENSOR OF THERMAL IMAGER SIGHT OF TANK T-72

1. What is the Problem (Need)?

Cant Angle Sensor provides input of tank barrel angle relative to the platform, which is crucial for firing accuracy. However, the Cant angle sensor of Thermal Imager (TI) sight on Tank T-72 is prone to faults and has limited availability being ex import, thus causing excessive delay in repairs. There is an urgent need to indigenise the Cant Angle Sensor.

2. Why it is Important to Solve?

Feeding of relevant inputs by various sensors to Fire Control System (FCS) of tank is inescapable to ensure effective firing of the tanks. An unserviceable Cant Angle Sensor affects the first round hit probability of tanks.

3. Contemporary Solutions by Other Countries/Organisations.

Spares are being procured from Foreign OEM presently.

4. Deliverables.

Indigenised Cant Angle Sensor of TI sight of Tank T-72, to mitigate the dependency on ex-import spares.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 78

GYROSCOPIC STABILIZER ASSEMBLY OF LRF TPDK-1 OF TANK T-72

1. What is the Problem (Need)?

Gyroscopic Stabilizer Assembly is fitted in Laser Range Finder (LRF) TPDK-1 (Main Gunner Sight) of Tank T-72, which is used for stabilization of sight of the Main Gun. The repair and testing facility of Gyroscopic Stabilizer Assembly of LRF TPDK-1 is not available with Base Workshop. Although Factory Repair (FR) facility exists, however since spares are procured ex import it leads to increased turnaround time for repairs. There is an urgent need to indigenise the Gyroscope Stabilizer Assembly, to reduce dependency on Foreign OEM and also to ensure that complete repair solution is available within the Army.

2. Why it is Important to Solve?

Gyroscopic Stabilizer of LRF TPDK-1 is an ex-import spare and is in short supply. Indigenisation of Gyroscopic Stabilizer would enhance the repair capability at Army Base Workshops.

3. Contemporary Solutions by Other Countries/Organisations.

Not Known.

4. Deliverables.

Indigenisation of Gyroscopic Stabilizer of LRF TPDK-1 (Main Gunner Sight) of Tank T-72, to mitigate the dependency on ex-import spares.

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PROBLEM DEFINITION STATEMENT – 79

ALL TYPES OF DEWAR DETECTOR COOLER ASSEMBLY

1. What is the Problem (Need)?

Dewar Detector Cooler (DDC) is a vital part of Thermal Imagers which converts Infrared/ thermal radiations in the spectral region of 3-5 μm or 8-12 μm into electrical signals, which is further processed for conversion into image. Each Thermal Imager has a unique DDC and cannot be interchanged with any other Thermal Imager of similar specifications due to Form Fit and circuitries. Since the DDC is ex-import and high cost, there is a delay in procurement. Hence, there is an urgent need to indigenise the DDC to reduce the dependency on Foreign OEM.

2. Why it is Important to Solve?

DDC Assembly is an ex-import spare. Non availability of DDC Assembly has resulted in large turnaround time of repairs of Thermal Imager sights and affects the availability of equipment to the Field Army.

3. Contemporary Solutions by Other Countries/Organisations.

Not Known.

4. Deliverables.

Indigenisation of DDC Assembly of Thermal Imager, to mitigate the dependency on ex-import spares.

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PROBLEM DEFINITION STATEMENT – 80

SCME - JACKET DOWN TROUSER DOWN

1. What is the Problem (Need)?

Extremely low temperatures ranging from minus 20°C to minus 50°C impose life threatening thermo-physiological effects on the human body. Special Clothing & Mountaineering Equipment (SCME) items are used by soldiers operationally deployed in super High Altitude Areas (HAA). Supply of Jacket Down Trouser Down (JDTD), a part of SCME, is still dependent on import purchase for want of indigenous suppliers.

2. Why it is Important to Solve?

To achieve self-sufficiency in manufacturing and prevent reliance on import from foreign countries.

3. Contemporary Solution by Other Countries/ Organizations.

The challenges have been overcome by foreign manufacturers through innovation and application of various technological/ scientific solutions. Thus, most are patented or proprietary products, which nonetheless are difficult to replicate or manufacture without sound technical knowhow.

4. Deliverables.

` Indigenous solution of the item should conform to following user requirements:-

(a) Olive green jacket (down filled) and trouser (down filled) as a set. Jacket to be provided with a detachable hood.

(b) Provide adequate warmth and comfort to troops deployed in super HAA and Siachen Glacier in temperatures up to minus 50°C and wind velocity up to 40 km/hr.

(c) To be light weight, comfortable to wear and allow for natural body movement while carrying out various physical activities. Should be suitable for rugged use.

(d) While providing protection from cold, wind, snow & rain, it should also let moisture to escape so as to keep the body dry and warm.

(e) Be free from any kind of odour and allergic sensation to the skin. Should be easy to clean, maintain and not deteriorate after washing.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 81

SCME - MODULAR GLOVES

1. What is the Problem (Need)?

Extremely low temperatures ranging from minus 20°C to minus 50°C impose life threatening thermo-physiological effects on the human body. Special Clothing & Mountaineering Equipment (SCME) items are used by soldiers operationally deployed in super High Altitude Areas (HAA). Supply of Modular Gloves, a part of SCME, is still dependent on import purchase for want of indigenous suppliers.

2. Why it is Important to Solve?

To achieve self-sufficiency in manufacturing and prevent reliance on import from foreign countries.

3. Contemporary Solution by Other Countries/ Organizations?

The challenges have been overcome by foreign manufacturers through innovation and application of varied technological/ scientific solutions. Thus, most are patented or proprietary product, which nonetheless are difficult to replicate or manufacture without sound technical knowhow.

4. Deliverables.

Indigenous solution of the item should conform to following user requirements:-

(a) Comfortable to wear outer, middle and inner gloves together.

(b) Provide protection and warmth during use in super HAA and glaciated terrain in temperatures up to minus 50°C and wind velocity up to 40 km/hr.

(c) Be adequately waterproof and prevent ingress of snow from the cuffs.

(d) Should draw away sweat/moisture from the hands and keep them dry & warm.

(e) Retain functional dexterity of hands and provide a good grip.

(f) Be suitable for rugged use and be free from any kind of odour and allergic sensation to the skin.

(g) Ease of washing & drying, and should not deteriorate after washing.

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IMPORT SUBSTITUTION/ INDIGENISATION

PROBLEM DEFINITION STATEMENT – 82

MOUNTAINEERING EQUIPMENT FOR HAA - ROCK PITON

1. What is the Problem (Need)?

Extremely low temperatures ranging from minus 20°C to minus 50°C affect both human body and equipment. High quality Special Clothing & Mountaineering Equipment (SCME) items are used by soldiers operationally deployed in super High Altitude Areas (HAA). Rock Piton is part of SCME and supply of the same is ex-import, necessitating indigenization.

2. Why it is Important to Solve?

To achieve self-sufficiency in manufacturing and prevent reliance on import from foreign countries.

3. Contemporary Solution by Other Countries/ Organizations.

The challenges have been overcome by foreign manufacturers through innovation and application of varied technological/ scientific solutions. Thus, most are patented or proprietary products, which nonetheless are difficult to replicate or manufacture without sound technical knowhow.

4. Deliverables.

Indigenous solution of the item should conform to following user requirements:-

(a) To be used in large range of vertical and horizontal cracks.

(b) Should withstand prolonged usage in super HAA with temperatures as low as minus 50°C.

(c) Should retain its shape, strength and durability even after repeated usage.

(d) Should not be prone to cracks, marks, deep scratches, deformation or burring.

(e) Should remain corrosion free.

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IMPORT SUBSTITUTION/ INDIGENISATION

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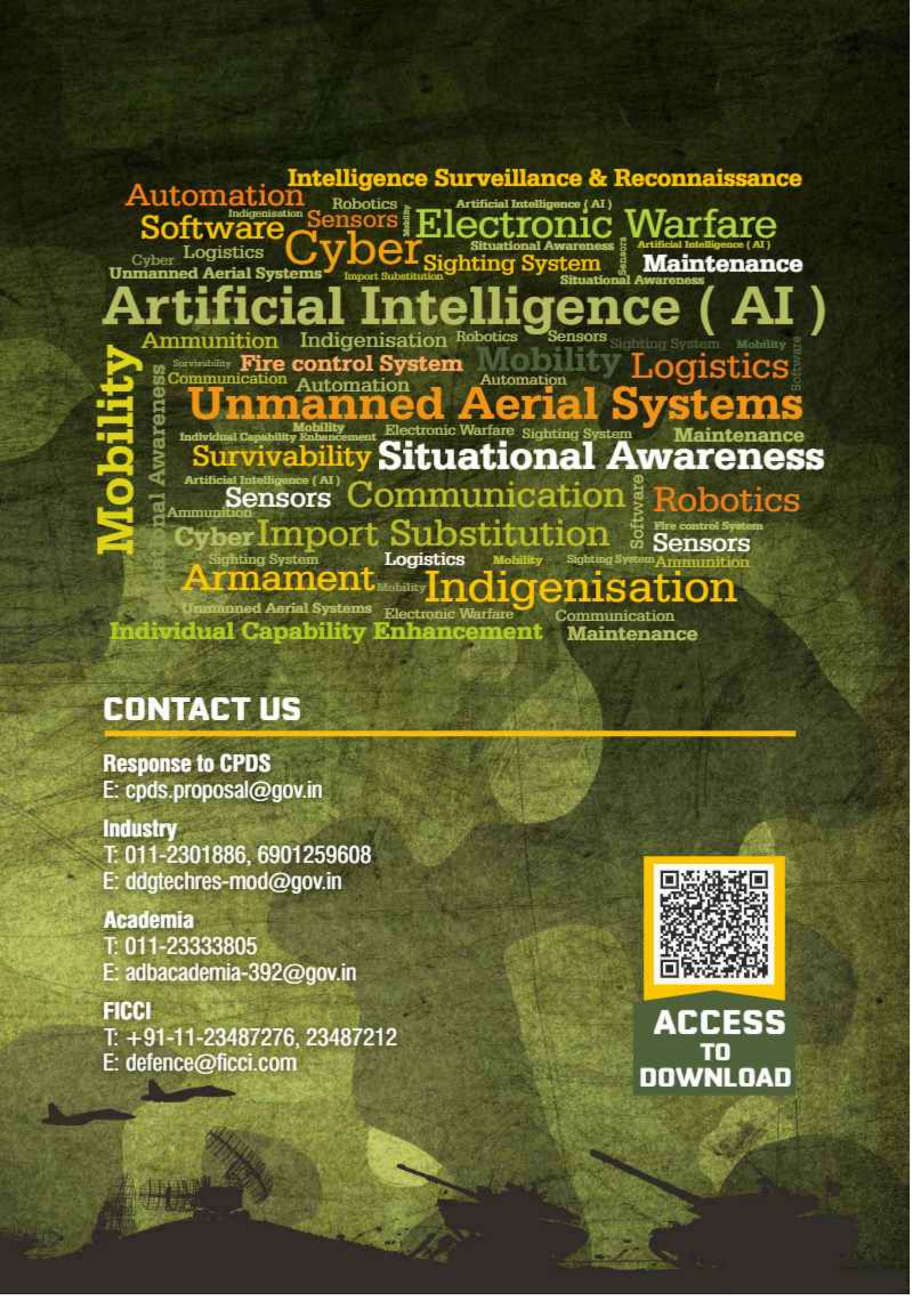

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