(Ref Para 11 of DDG IT letter No B/ 04001/ Policy/ Sw/DDG IT (T&P) Dt as in Digital sign)

CHECK LIST TO BE ATT WITH SOC FOR THE PROPOSAL

Ser No	Mandatory Details	
1.	Name of proj (ind ver).	Sarvatra Drishti - GeoSpatial Engine for Change & Object Detection in Satl Imagery using AI Algorithm.
2.	Name of sponsor.	College of Military Engineering, Pune
3.	Type of Sw (Bespoke / COTS / Customized).	Bespoke
4.	Brief justification/ endorsement on reqmt for devp of Sw appl	Satl-based earth observation data is essential for updating and maintaining Geospatial Intelligence (GEOINT), but the vast volume of imagery poses challenges for manual analysis, leading to overlooked critical data. To address this, an automated sys utilising advanced cmptr vision and AI, including deep learning and change detection engines, is proposed. The sys streamlines satl imagery analysis by detecting small changes, generating automated reports, and prioritising critical data. It integrates a secure URL-based authentication sys, supports object detection and segmentation for detailed analysis, and includes a correction loop for refining predictions. This solution enhances accuracy, efficiency, and intelligence reporting for mil and decision-making operations.
5.	Aim, Scope and Purpose incl utlity, beneficiaries and tgt users	**Aim**. The project aims to develop an automated sys for satl-based earth observation data analysis, focusing on object detection and change detection. By leveraging deep learning models and cmptr vision techniques, the sys will enhance the efficiency and accuracy of Geospatial Intelligence (GEOINT) operations,

		enabling more effective situational awareness and decision-making in mil and surveillance contexts. **Scope.** This sys is designed to automate the analysis of large satl imagery datasets, detect small changes, and generate comprehensive reports for experts. It incorporates a correction loop, URL-based authentication, and supports both object detection and segmentation. The solution is scalable and can operate on high-performance machines as well as standard devices, making it suitable for a wide range of operational environments. **Purpose**. The project addresses the challenges of manually analysing vast amounts of satl data, which is time-consuming and error-prone. By automating the process, the sys provides timely, accurate insights into detected changes in the imagery, supporting mil intelligence, surveillance, reconnaissance operations, and other decision-making processes.
6.	To be hosted on internet/ ADN with brief justification	The appln is designed to operate within a standalone environment to meet high computational demands and is currently configured for offline use. However, with certain modifications to the project configurations, it can be adapted to run within an ADN (Appln Delivery Nw) environment, if necessary.
7.	Being devp in house or through IT funds	Devp through I R&D Fund.
8.	Usability of proposed appls by other arms/services/org/est	The appln is specifically designed for use by the Indian Army and is tailored to meet their unique operational needs. As such, its current configuration and functionalities are not intended for broader applicability across other organisations or services. Any potential adaptation for use by different entities would require significant modifications to address their specific requirements and integration needs.

9.	Hw and IT infrastructure reqd in the form of Virtual Machines at Data Centre (incl memory, storage and processing capb).	As it is devp to install in standalone sys and not to be hosted on server at data centre. Therefore, reqmt of Virtual machine is not reqd. However, the Hw and Sw required for the Sw is as below :- **(a) <u>For Inferencing</u>** (i) Processor (CPU): Intel Core i5-11600K or AMD Ryzen 5 5600X (ii) Memory (RAM) : 8GB DDR4 RAM (Min) (iii) Graphics Card (GPU): NVIDIA GeForce RTX 3080 (iv) Storage: Solid State Drive (SSD) with at least 500GB NVMe PCIe Gen4 storage capacity (v) Operating Sys: Windows 10 (64-bit) or newer **(b) <u>For Trg</u>** (i) Processor (CPU): Intel Core i7-11700K or AMD Ryzen 7 5800X (or higher) (ii) Memory (RAM): 16GB DDR4 3200MHz (or higher) (iii) Graphics Card (GPU): NVIDIA GeForce RTX 4090 24GB GDDR6X (or equivalent) (iv) Storage: Solid State Drive (SSD) with at least 500GB NVMe PCIe Gen4 storage capacity (v) Operating Sys: Windows 10 (64-bit) or newer (vi)
10.	Brief details of content of the proposed Sw appl.	Sarvatra Drishti is a cutting-edge mil technology appln designed to enhance the accuracy and reliability of object detection and change detection through advanced segmentation processes. The primary goal of this project is to improve the pipeline for object and change detection by integrating an interactive correction method, enabling users to refine and address inaccuracies in satl imagery in real time.
11.		

	Endorsement by Head of Br/ Svc/ Fmn	Post approval from ARTRAC commander, the proj was sanctioned through IR&D fund
12.	Details of user base	The primary user base for Sarvatra Drishti comprises mil personnel involved in surveillance, reconnaissance, and op planning. which includes: (a) Field Operatives: Soldiers and officers engaged in real-time operations who require accurate and immediate object detection to assess threats and make informed decisions during missions. (b) Intelligence Analysts: Personnel responsible for analysing visual data from various sources, such as satl imagery and video feeds, to support strategic planning and intelligence gathering. (c) Mission Planners: Individuals involved in designing and coordinating mil missions who rely on precise object detection and change detection to ensure mission success and operational safety. (d)
13.	Envisaged cost of entire proj incl license fees and maint	Proj cost : 40.77 Lakh Status : Completed Licence : Perpetual
14.	Projected dt of completion inci maj timelines	Proj status: Completed
15.	Brief details of Sw platform and tech stack proposed for devp of appl ind op sys dependencies (if any).	1. The appln is delivered as an executable (.exe) file designed to run on Windows machines, provided that the sys meets the specified requirements. The software is developed using the following technologies and platforms: (a) **Operating Sys**. Windows (64-bit) (b) **Deep Learning Frameworks**. Leveraging advanced deep learning algorithms and framework named PyTorch for object and change detection. (c) **Web Development Framework**. Django, used for building the web-based components of the appln. (d) **Geospatial Packages** Python libraries for geospatial analysis and processing.

		(e) **Database**. PostgreSQL, utilised for robust data management and storage.
16.	Brief details of proposed nw and bandwidth reqmts	1. For the Sarvatra Drishti appln, the nw and bandwidth requirements are minimal since all necessary software components are provided as part of the installation package. (a) **Ongoing Operation**. Once installed, the appln operates entirely offline, with no further nw or bandwidth requirements for its core functionalities. (b) **Data Transfers**. Any data transfers, such as updating or exporting results, can be managed within the local nw or offline. (c) **Internet Connectivity**. Not Required
17.	Brief details of OS & Sys software reqmts.	1. **Operating Sys**. Windows 10 (64-bit) or better 2. **Additional Software**. All necessary components and dependencies are included in the provided executable file. No additional sys software needs to be downloaded or installed separately.
18.	Brief details of proposed data security measures incl backup of data.	1. Since the appln is currently running in standalone mode with no internet connectivity, all data is stored directly within the file sys of the standalone sys. The following data security measures are in place. (a) Access Controls: User access is controlled through robust authentication mechanisms and role-based permissions, ensuring that only authorized personnel can access or modify data.
19.	Brief details of proposed database engine to be used in the appl.	The appln will use PostgreSQL as the database engine. PostgreSQL is a robust, open-source relational database management sys known for its reliability, advanced features, and strong data integrity capabilities. It will handle data management and storage requirements efficiently within the standalone environment.
20.	Detls of Sw architecture and COTS Sw proposed to be utlised	1. **Software Architecture**.

		(a) **Modular Design**. The appln follows a modular architecture, consisting of distinct components for object detection, data correction, and user interface (b) **Functionalities**. This modular approach ensures flexibility, ease of maintenance, and scalability. (c) **Deep Learning Framework**. The core object detection and change detection functionalities are powered by deep learning frameworks. These components are responsible for processing and analysing visual data to identify and track objects. (d) **Web Development Framework**. Django is utilised for building and managing the web-based components of the appln, providing a user-friendly interface for interacting with the sys and managing data. (e) **Geospatial Processing**. Specialised Python libraries for geospatial analysis are integrated to handle satl imagery and spatial data processing, ensuring accurate and efficient analysis. (f) **Database Management**. PostgreSQL is used as the database engine for data storage and management. It handles the data generated and used by the appln, including user corrections and analysis results. **2. COTS Sw** (a) **Operating Sys**. Windows 10 (64-bit) or better is required to run the appln. The software is packaged as an executable (.exe) file designed for this operating sys. (b) **Deep Learning Libraries**. Off-the-shelf deep learning libraries and tools, such as PyTorch, are used for building and trg the object detection models. (c) **Geospatial Libraries**. Commercial and open-source geospatial libraries, such as GDAL or Rasterio, may be used for handling and analysing spatial data.
21.	Detls of proposed architecture - Centralised/ Federated/Hybrid	1. The proposed architecture for the appln is centralized which includes:- (a) **Single Centralised Sys**. All core functionalities, including deep learning processing, data management, and user interactions, are handled within a

		single, standalone sys. This approach ensures that all components are integ and managed from a central point, providing streamlined operation and maintenance. (b) **Data Storage and Processing**. Data is stored and processed locally within the standalone sys, with no external dependencies or nw requirements. This design ensures data security and integrity by keeping all operations within a controlled environment.
22.	Brief details of proposed utilisation of Public Key Infra (PKI) and Iden and Access Mgt (IAM).	NA
23.	Technology dependencies (if any).	1. The appln has the following technology dependencies:- (a) **Operating Sys**. Windows 10 (64-bit) or better. (b) **Deep Learning Frameworks**. PyTorch for developing and deploying deep learning models. (c) **Web Development Framework**. Django for building the web-based interface and managing interactions with the sys. (d) **Geospatial Libraries**. GDAL or Rasterio for processing and analysing geospatial data and satl imagery. (e) **Database Engine**. PostgreSQL for data management and storage. (f) **Python Libraries**. Additional Python libraries and packages required for various functionalities, including data manipulation and visualisation.
24.	Database reqmts	**Database Engine**. PostgreSQL
25.	Enhancement/ upgradation (incl patch mgt/ Sw updt procedure and mechanism)	1. **Annual Maintenance**. The appln will include a one-year maintenance period following project delivery. During this time, any necessary bug fixes, minor improvements, and support issues will be addressed as part of the maintenance agreement. 2. **Enhancement and Upgradation**. Post the initial maintenance period, enhancements and

		additional functionalities will be available at an additional cost. These updates will include new features, performance improvements, and adaptation to changing requirements or technologies. 3. **Patch Management**. Regular patch management will be implemented to ensure that the appln remains secure and up-to-date. This involves monitoring for new security vulnerabilities, applying patches and updates promptly, and testing these updates to ensure compatibility and stability. 4. **Software Update Procedures**. (a) **Release Schedule**. Updates and new releases will be scheduled and communicated in advance. Major updates will be planned to minimize disruption to users. (b) **Testing**. All updates and new features will undergo thorough testing in a staging environment before being deployed to ensure they meet quality standards and do not introduce new issues. (c) **Deployment**. Updates will be deployed following a defined procedure, including user notifications, backup of existing data, and verification of successful installation. (d) **User Trg**. Trg and documentation will be provided for users to familiarise them with new features or changes introduced by updates
26.	Details of licensing (if any)	NA

Ser No	Pre Devp- Stage- To be submitted for grant of IPA	Response of Stakeholder
Sigs- 7		
1.	**Hardware Reqmt**. To be rationalized by developer with supported load calculation	
2.	**Bandwidth Reqmt**. No of concurrent users access the appl on ADN to be highlighted, Common user bandwidth to be utilized no dedicated bandwidth to be provided.	
3.	**Encryption**. IACA SSL cert to be incorporated for secure HTTPS connection (TLS 1.3 should be impl).	
4.	**IAM**. Appl developer to design and devp the appls for integ with IAM (SAML 2.0 needs to be followed).	
5.	**Ports**. 443 port to be used for hosting, any add port reqd should be justified.	
6.	**Software**. Sponsor Dte to provn for licensed OS and other reqd softwares for the appl.	
ACG		
1.	**Advisory on Appl Security**. Evolving (URD) User Requirement Document (Hosted at ACG Website -Web/ App Devp - Test & Eval Advisories).	
2.	**Impl of Secure Coding Prac in IA**. HCL AppScan VS Code Sweep (ACG letter No B/51106/ArCyGp/T-3/T&E dt 04 Aug 23).	
3.	Advisory on Cyber Security Parameters for Websites hosted within ADN (Hosted at ACG Website - Web/Appl Devp Test & Eval Advisories).	
4.	Guidelines for Indian Govt Websites (G/GW 3.0)	
ASDC		
1.	Platform to be used check and render advice on Long Term Sp ind the End of Life.	
2.	Database to be used-check and render advice on Long Term Sp incl the End of Life.	
3.	Software architecture and COTS Sw dependencies- native/ webbased/ centralized/ decentralized, offline/ online mode, Selection criteria of COTS Sw etc.	
4.	Integration reqmt with other Sw (online/ offline)-recommend appls alongwith the requisite formats of exch.	
5.	Usagability of Sw by other arms/ service/ fmns/ orgs- advise soponsor fm scalability pt of view.	

Ser No	Post Devp Stage- To be submitted for vetting of Sw appl.	Response of Stakeholder
Sigs- 7		
1.	**OS & Software**. (a) OS and softwares used in appl should be activated (licensed) If applicable. (b) The OS and the softwares used should not be outdated. (c) The appl should not use vulnerable scripts and libraries.	
2.	**Hardware Resources**. (a) The hardware resource used by the appl should be justified by the sponsor Dte with valid calculations. (b) Stress testing of the appl is done with the anticipated concurrent users to check the hardware utilization of the appl. (c) A website with up to 1000 concurrent users should not consume more than 8 CPU cores and 16 GB RAM. (d) A relational database server (Mysql/MSsql/Postgres) with 1000 concurrent users should not consume more than 24 CPU and 48 GB RAM. (e) A web appl server with 1000 concurrent users should not consume more than 16 CPU and 32 GB RAM. (f) A Geospatial server (GIS) with 1000 concurrent users should not consume more than 32 CPU and 64 GB RAM.	
3.	**Compliance**. (a) Websites should follow GISW present. (b) All the downloadable data (PDF) should be watermarked, (c) Links (i) No broken Inks to be present. (ii) All the websites / appl linked in the page should be vetted. (iii) Only whitelisted SW (as per ACG guidelines) links to be provided for download. (d) Metatags should be enabled. (e) No direct streaming of Video / Audio.	
4.	**IAM**. (a) Iam integ to be completed (SAML 2.0)	

	(b) Encrypted login and logout to be implemented. (c) User list (usernames in domain) to be onboarded should be shared with AHCC. (d) Two factor authentications if reqd should be impl with IACA DSC token.	
5.	**Deployment Arch**. (a) Sponsor Dte to give a pstn explaining the entire workflow on the sw appl along with its detailed dply architecture. (b) Sponsor Die / developer to explain all the intended functionalities and features of the appl. (c) Clarify any ambiguities or discrepancies with the devp team before commencing the vetting process. (d) Strict version control to be adhered during the iterative process of vetting. (e) The appls requiring PKI services, must have inbuilt OCSP and CRL protocols for certificate validation.	
6.	**Performance / Stability Testing**. (a) Appl/ Website initial loading on the browser should not be more than 4 MB (screenshot alt at Appx A). (b) The max response time for the appl / website should not be more than 5 seconds. (c) The appl should not crash when load tested with anticipated concurrent users.	
7.	**Functional Testing**. (a) Perform testing of each ind function and feature of the web appl (b) Validate input fields, forms, button navigate and interactive elements. (c) Verify proper data validation, error msgs and expected outcomes.	
8.	**Compatibility Testing**. (a) Should be compatible with older supported versions of browsers (chrome/edge/firefox). (b) Should be compatible with different versions of third-party plugins or framework.	

	(c) Regression Testing-Retest previously identified issues after fixes have been implemented. (d) Ensure that fixes have not introduced new problems or unintended side effects.	
9.	**Encryption**. IACA SSL cert to be incorporated for secure HTTPS connection (TLS 1.3 or latest should be impl).	
10.	**Forms Read**. GIGW cert, DNS regn form, DGMI (MI-11) content vetting form, Watermarking cert, SSL regn and SRDP regn form are rod to be submitted to DG Sigs for hosting on ADN	
ACG		
1.	Advisory on Single Window Clearance Initiative (ACG letter ref B/51106/ArCyGp/T-3/T&E/Adv1 dl 24 Aug 2023)	
2.	Advisory on Tech Vetting for Whitelisting of Sw for AND Dply (DG Sigs letter ref B/46850/IT/Sigs 7 (a) dt 03 Mar 2022).	
3.	User Friendly Guidelines for Expediting Vetting if Websites/ Web Appl (Hosted at ACG Website Web/Appl Devp Test & Eval Advisories).	
4.	CERT Advisory No 08/2023 on conduct of Vulnerability Analysis of Sw of IA by CERT-IN Empanelled Firms (Hosted at ACG Website Web/Appl Devp-Test & Eval Advisories).	
5.	Advisory No 12-2016 on Hardening of Web Server, How to make VDI for Web Testing, Web Testing Tool, Patch Mgt and OS (Hosted at ACG Website-Web/App] Devp-Test & Eval Advisories).	
6.	Further, for the better transparency and user awareness, real-lime appl vetting status is hosted on ACG Website (ACG Website Web/ Appl Devp-Web/Appl Vetting Status).	
7.	CERT Advisory No 13/2023 on API Security.	
DDGIT		
1.	Fwd VDI of final Sw appl.	
2.	Fwd data dictionary of data	
3.	Obtain whitelisting Certificate	