IIId ARMORED CORPS INTEGRATION OF COUNTERFIRE HEATMAP v2 & RED AIR TRACKS IN WFX 25-4

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The Army Software Factory (ASwF) team supporting IIId Armored Corps (IIIAC) were driven to continuously improve and build on the innovative automation of the counterfire heatmap developed during IIIAC's Warfighter 25-4 (WFX 25-4) progression. The team established ambitious goals to enhance IIIAC's lethality in large scale combat operations (LSCO). Mirroring the aggressive timeline of the initial heatmap deployment, IIIAC and the development team collaborated to deliver tangible results for rigorous testing and evaluation during WFX 25-4—the most complex Warfighter exercise to date. This effort proved decisive, enabling the Corps, comprised of four Multinational Maneuver Divisions and several enabling brigades, to rapidly overwhelm the opposing force within just three days of simulated combat. Central to this success were the refined Counterfire Heatmap and the newly developed Red Air Tracks Heatmap, which collectively advanced the Corps' ability to visualize, interpret, and exploit operational data across warfighting functions. This article outlines our approach following IIIAC's CPX II, ("Automating the Counterfire Heatmap", June 2025 by COL John "Jay" Bradley and LTC Linda Chung) focusing on stabilizing the IOC product and adaptively integrating Red Tracks capabilities, while highlighting their integration across warfighting functions (WfF) and staffs through enhanced end-user access –

ultimately demonstrating a viable pathway for the Army enterprise to achieve decisive lethality against the world class opposing force (WCOPFOR).

STABILIZING THE COUNTERFIRE HEATMAP

The counterfire heatmap project transitioned to a new team following the successful proof of concept achieved during CPX II. Development objectives included a mandate to enhance stability and usability. The software underwent a comprehensive refactor, consolidating disparate scripts into a unified application ran on a Joint Automated Deep Operations Coordination System (JADOCS) platform. The 75th Field Artillery Brigade (FAB) provided a Tactical Server Infrastructure - Small (TSI-Small), which significantly improved stability for geographic data services through ArcGIS.

Shared unrelated workloads presented initial technological challenges which resulted in daily resets that disrupted functionality. Resolution came through strategic prioritization by 75th Field Artillery Brigade (FAB) by offshoring certain workloads.

This offshoring decision enabled uninterrupted operation and the use of rollback snapshots for version control.

Despite the complexity of integrating AFATDS, JADOCS, and ArcGIS, the new version represented substantial progress in reliability and usability. Feedback from this process also informed the conceptual and technical design of the Red Air Tracks Heatmap.

An initial effort to visualize Ground Moving Target Indicator (GMTI) data revealed that an abundance of data points—though technically impressive—generated excessive visual "noise," diminishing practical utility and reducing analysts' ability to effectively use the map. With the stakeholder on board, the development team deprioritized GMTI and instead pivoted towards addressing the red air problem set, while preserving GMTI capabilities for future use via JADOCS.
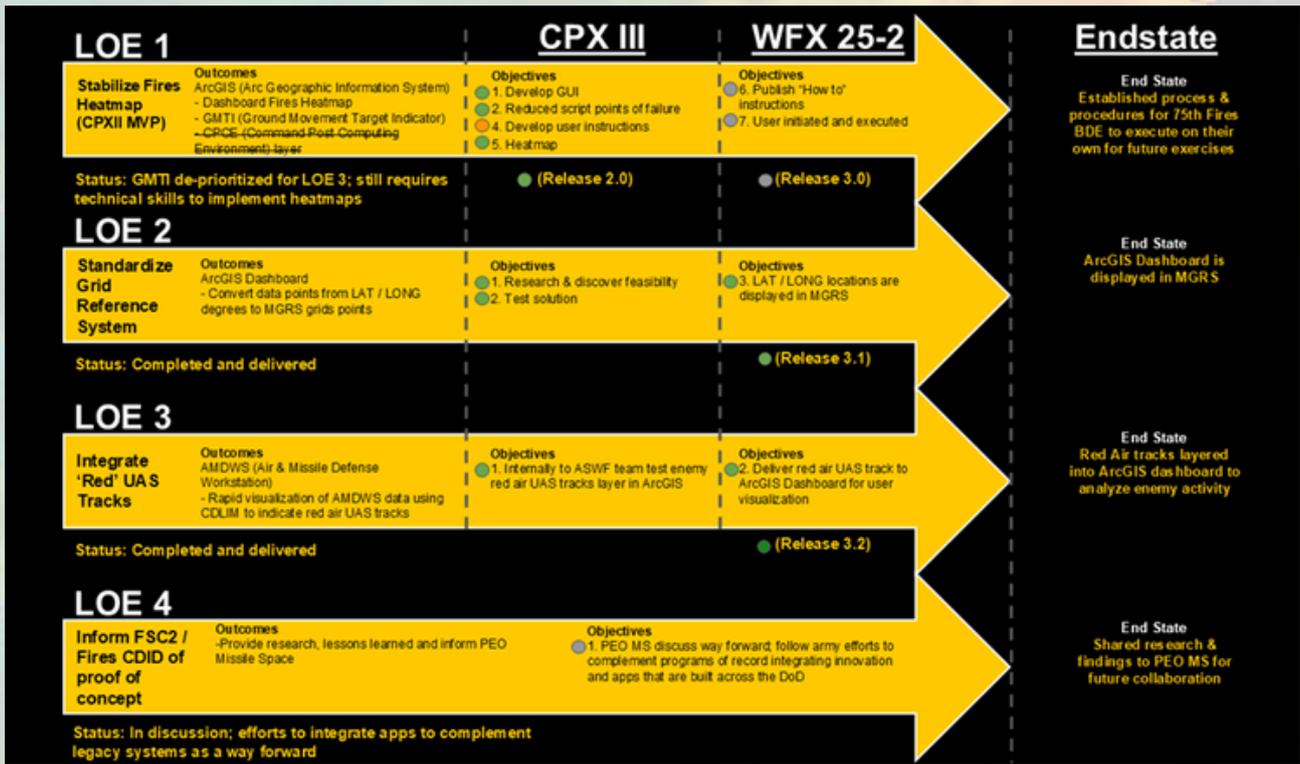
LOE 1		CPX III	WFX 25-2	Endstate
Stabilize Fires Heatmap (CPXII MVP)	**Outcomes** ArcGIS (Arc Geographic Information System) - Dashboard Fires Heatmap - GMTI (Ground Movement Target Indicator) - CPCE (Command Post Computing Environment) layer	**Objectives** ● 1. Develop GUI ● 2. Reduced script points of failure ● 4. Develop user instructions ● 5. Heatmap	**Objectives** ● 6. Publish "How to" instructions ● 7. User initiated and executed	**End State** Established process & procedures for 75th Fires BDE to execute on their own for future exercises
Status: GMTI de-prioritized for LOE 3; still requires technical skills to implement heatmaps		● (Release 2.0)	● (Release 3.0)	
LOE 2				**End State** ArcGIS Dashboard is displayed in MGRS
Standardize Grid Reference System	**Outcomes** ArcGIS Dashboard - Convert data points from LAT / LONG degrees to MGRS grids points	**Objectives** ● 1. Research & discover feasibility ● 2. Test solution	**Objectives** ● 3. LAT / LONG locations are displayed in MGRS	
Status: Completed and delivered			● (Release 3.1)	
LOE 3				**End State** Red Air tracks layered into ArcGIS dashboard to analyze enemy activity
Integrate 'Red' UAS Tracks	**Outcomes** AMDWS (Air & Missile Defense Workstation) - Rapid visualization of AMDWS data using CDLIM to indicate red air UAS tracks	**Objectives** ● 1. Internally to ASWF team test enemy red air UAS tracks layer in ArcGIS	**Objectives** ● 2. Deliver red air UAS track to ArcGIS Dashboard for user visualization	
Status: Completed and delivered			● (Release 3.2)	
LOE 4				**End State** Shared research & findings to PEO MS for future collaboration
Inform FSC2 / Fires CDID of proof of concept	**Outcomes** -Provide research, lessons learned and inform PEO Missile Space	**Objectives** ● 1. PEO MS discuss way forward; follow army efforts to complement programs of record integrating innovation and apps that are built across the DoD		
Status: In discussion; efforts to integrate apps to complement legacy systems as a way forward				

FIGURE 1. LOE FLOWCHART (FIGURE BY AUTHORS)

RAPID DEVELOPMENT OF THE RED AIR TRACKS HEATMAP

Following the successful delivery of the second version of the counterfire heatmap, the next challenge was identifying potential enemy rotary wing and unmanned aerial system threats including enemy Forward Arming and Refueling Point (FARP) sites and UAS ground control stations (GCS). The software team rapidly developed this capability relying on previous experience with the counterfire heatmap and it followed a similar data visualization concept.

IIIAC personnel provided input from ADA subject matter experts from the Fires Center of Excellence (FCOE) as well as the Capability Development Integration Directorate (CDID).

After initial investigations into Air and Missile Defense Workstation (AMDWS) limitations, the team discovered the Common Data Link Interface Module (CDLIM) as a more suitable solution for integrating sensor data. The CDLIM enables weapon system and sensor platform interoperability by facilitating data exchange over various communication links.

In partnership with IIIAC's air defense experts, the team linked AFATDS to CDLIM, enabling the app to capture red air activity and visualize tracks via red icons with yellow dotted tails signifying recent positions allowing analysts to detect patterns and infer likely launch points or FARPs. Unlike AFATDS, which lacks persistent data storage, the Red Air Tracks Heatmap maintains and archives data within its own database, this provides an advantage over existing systems as AMDWS and CDLIM do not present past data.

Rather than relying on complex algorithms to detect potential hotspots, the heatmap highlights areas with concentrated red air activity. These highly concentrated areas may indicate a likely critical enemy FARP or launch site which can then be further investigated by intel or air assets. Developed in collaboration with G2 intelligence personnel, the Red Air Tracks Heatmap was made accessible alongside the counterfire heatmap to anyone on the mission partner network (MPN) via a simple URL. URL access flattened usability across the IIIAC staff, divisions, and enabling brigades.

ADAPTIVE INTEGRATION ACROSS WfF

Accessibility proved as the most transformative aspect of both heatmaps. Unlike legacy systems such as JADOCS or AMDWS, which are gated by platform dependencies and operator training, the heatmaps deployed as Software-as-a-Service (SaaS) applications, accessible via simple URLs on tactical networks and not limited to the system operator.

The counterfire heatmap provides several advantages over the currently used JADOCS. While JADOCS possesses a counterfire function, the system's overall functionality severely lacks for dynamic targeting in LSCO. While directly connected to AFATDS, the connection is notoriously unstable; AFATDS data volume routinely overwhelms and crashes JADOCS servers. The system itself relies on periodic updates and fails to provide immediate, live, or near real-time information feeds critical for effective counterfire missions. Functionally, JADOCS presents information as simple red and blue lines – a visualization rooted in 1990s technology – and lacks the density visualization, analytical capabilities, and intuitive, user-friendly interface

which LSCO demands. With sunsetting scheduled for FY28 and no further investment planned, the JADOCS replacement, the Joint Targeting Integrated Command and Coordination Suite (JTIC2S), is slated to come online in October 2025, marking a crucial step towards a more capable and reliable targeting architecture.

Examples of dynamic integration included:

- Space Operations: Operators worked with data analytics to rapidly sort thousands of Overhead Persistent Infrared (OPIR) data lines, then pair the OPIR data against the counterfire heatmap data. This enabled matching battlefield activities including friendly points of impact (POIs) to then make determinations of unique battle damage indicators (BDI) from friendly artillery strikes.

- Attack Aviation: During one of the combat aviation brigade's (CAB) deep attacks when enemy assets failed to materialize, the brigade S2 used the heatmap to identify enemy artillery assets' locations and neutralized them on their return to the Corps Support Area. Instead of a

wasted investment ·with calculated risk involving aircraft and pilots during penetration of the enemy ADA bubble, attack aviation was able to remove enemy assets from the battlefield.

- Process, Exploitation, and Dissemination (PED) Cell: The PED cell's intelligence analysts cross-referenced the heatmap with the GMTI feed to identify locations of enemy artillery formations.

- Information Operations: This cell worked in conjunction with Explosive Ordnance Disposal to identify possible unexploded ordnance (UXO) sites. This enabled delivery of cautionary notices to the local civilian population.

In one illustrative case, red UAS tracks revealed a presumed logistics warehouse to be a Shahed drone launch site due to a dense population of red air activity, which was subsequently neutralized. Overall, the counterfire heatmap provided tremendous added value to the entire IIIAC umbrella outside of just the counterfire headquarters.

In summation, the recently developed counterfire heat map provides the Corps and Division warfighting staff with exponential advantages over the outdated legacy system, JADOCS. A system of record gated behind hardware, training, and login information poses no significant relevance when it fails to provide real-time and archived data such as the counterfire heat map.

ENHANCING THE CAPABILITIES OF THE 3UK'S ARTILLERY INTELLIGENCE CELL

During WFX 25-4, the use of heatmaps was effectively promulgated across the entire Corps, offering significant value to the 3rd UK Division's Artillery Intelligence (Arty Int) subject matter experts (SMEs). Equipping Arty Int SMEs with heatmaps provided the Iron Division with a comprehensive understanding of the enemy's artillery threat, enabling them to effectively mitigate adversary fires.

The integration of the Arty Int team within the Deep Reconnaissance Strike Command Post (DRS CP) proved invaluable. Their direct input into the planning process enhanced both operational planning and situational awareness across the division.

"The Corps CF Heatmap provided 3UKXX counterfires with greater situational awareness in conducting the counterfires fight. It enabled the Artillery Intelligence Cell to refine its assessments and for the JAGIC to STRIKE OPFOR fires when the point of impact was in our AO, but the point of original was across the division boundary."
– Capt. Tom Brownlow, Artillery Intelligence Officer, 5th Regiment Royal Artillery (The Yorkshire Gunners).

Notably, the use of Artillery Intelligence (Arty Int) heatmaps within the Multi-domain Data Analysis Artificial Intelligence (MDDAAII) software marked a first for UK forces and proved essential to the targeting cycle. These heatmaps significantly enhanced our understanding of enemy capabilities by providing the Multi-Domain Operations Planning Team (MD OPT) with critical data on observed enemy fire locations. This intelligence directly informed the planning of aviation deep attacks, convergence of multi-domain effects, and adjustments to fire priorities.

Arty Int Subject Matter Experts (SMEs) highlighted the value of this tool and recommended that, moving forward, heatmaps be fully integrated as both a planning and execution tool. They emphasized the importance of commanders routinely leveraging the live data provided by these heatmaps to inform decisions throughout operations.

STRATEGIC IMPLICATION & THE WAY FORWARD

The next phase of innovation for the Counterfire and Red Tracks Heatmaps is twofold: delivering an immediate, scalable IIIAC solution, while simultaneously initiating pathways for an enterprise-level capability through formal Program Executive Office (PEO) engagement. The success of the current counterfire heatmap was limited by the lack of partner sensor data - a blind spot which increases risk.

LONG-TERM ARMY SOLUTION: FORMALIZING THE REQUIREMENT

To ensure the lating impact of these tools, we are re-engaging PEO stakeholders to formally

share our results, and the operational effects demonstrated during WFX 25-4. By highlighting how the Counterfire and Red Air Tracks Heatmaps closed critical capability gaps, we aim to influence the next build cycle of existing systems of record. Rather than prescribing a solution, our goal is to present the proven impact and allow PEO to absorb the validated need as a formal requirement—delivered through their own system development processes. This ensures the capability is scaled, sustained, and integrated within the Army's modernization strategy.

INTERIM IIIAC SOLUTION: WEB-BASED TARGETING APPLICATIONS

While working toward enterprise adoption, IIIAC continues to build an interim, web-based capability focused on speed, accessibility, and relevance. Our objective is to evolve both the Counterfire and Red Air Tracks Heatmaps into fully operational, self-contained web applications—accessible via URL, intuitive to use, requiring low-to-no technical support, and able to be launched on any network.

This is the foundation for a broader IIIAC Web Suite—a modular ecosystem of lightweight apps aligned to each warfighting function. This aligns with the IIIAC Chief of Staff's vision to centralize all sensor data, eliminate stovepipes, and empower every section across the Corps to contribute to real-time decision-making. The solution is also designed for eventual utilization by downtrace and partner formations, increasing interoperability and shared understanding across formations and domains.

PARTNER SENSOR DATA INTEGRATION: MIP & ASCA (In-Progress)

Although not yet implemented, IIIAC is actively working to explore integration of partnered sensor data through the Multilateral Interoperability Program (MIP) and Artillery Systems Cooperation Activities (ASCA). These efforts remain aspirational but achievable, representing a major step toward expanding Corps-level capabilities to enable multinational and joint interoperability.

The intent is to allow future heatmap iterations to consume relevant allied and coalition data. This would enable coalition-accessible visualizations via secure web platforms and create opportunities to experiment with real-time data fusion in combined operations.

We recognize that MIP and ASCA integration has not yet been achieved, but it is a critical development objective and long-term targeting modernization.

WHY IT MATTERS

Legacy tools like JADOCS and AMDWS remain brittle, isolated, and technically burdensome—built for a different era. The IIIAC web application model directly addresses these gaps.

- No installs
- Broad accessibility
- User-friendly visualization
- Operable by any staff function, at any echelon

It eliminates the "monitor divide" and creates a shared understanding across all WfFs with near-real-time data to make quicker decisions.

CONCLUSION

The integration of both the Counterfire and Red Air Tracks Heatmaps—alongside broader staff adoption of data-driven insights— was a key enabler of III Corps' operational success during Warfighter Exercise 25-4. The versatility of both heatmaps lies in their ability to generate and display near real-time data visualizations via a simple URL. This extends analytical capabilities far beyond AMDWS and AFATDS operators, reduces stovepipes, making the data accessible to the Corps staff.

This accessibility transformed the entire Corps staff into an integrated offensive capability. Functional sections were able to monitor enemy activity, move faster with coordination and analysis, initiating the dynamic targeting process, to close in and destroy the enemy.

The integration of the heatmaps proved transformative— significantly degrading the WCOPFOR's operational capacity by targeting critical enablers. These effects included the destruction of over 1,200 tanks, 108 9A52 Smerch rocket launchers, and more than 600 artillery systems.

Additionally, over 500 other systems—such as ADA assets, jammers, Ground Control Stations, and Fire Control radars—were eliminated. The WCOPFOR ultimately sustained nearly 100,000 casualties.

While IIIAC achieved tactical success in WFX 25-4, the lasting impact was the validation of a new, automated approach to data-driven operations. Together, the Counterfire and Red Air Tracks Heatmaps represent a major step forward, realized through the Army Software Factory's tactical software operations and III Armored Corps' commitment to operationalizing data at scale.

ABOUT THE AUTHORS

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