G-2 Integration of CBR Data

1stMarDiv and counterbattery data analysis from MEFEX 18

by 1stLt Chandler A. Marcus

During the execution of MEF Exercise 2018 (MEFEX 18), the 1st MarDiv G-2 integrated the massive amounts of counterbattery radar (CBR) data from 11th Marines to conduct more thorough analysis and better characterize the enemy. During this process, the G-2 identified several key findings. First, the G-2 Marines discovered that without a robust data analytic system, such as Palantir, their intelligence workstations (IW) do not possess the analytic capability to leverage highly valuable CBR data. Secondly, they identified significant limitations in our current intelligence and fires programs of record (POR). Specifically, there continues to be a lack of interoperability and integration among cross-warfighting function POR systems, which are desperately needed for more rapidly sharing and analyzing non-traditional intelligence, surveillance, and reconnaissance data sets, ultimately to enhance the sensor-to-shooter and intelligence processes. Third, they discovered that Palantir provides effective functionality and the capacity to aggregate, analyze, and graphically display CBR data, thus providing invaluable tools to support predictive analysis to aid in intelligence operations across the intelligence cycle (see Figure 1).[1]

To contribute to more timely and accurate intelligence in support of the decision-making cycle and the sensor-to-shooter process, it is imperative that the Marine Corps continues to consistently and effectively exploit CBR data from a non-traditional intelligence, surveillance, and reconnaissance asset in order to fill analytic gaps and create a better medium to share and communicate information.

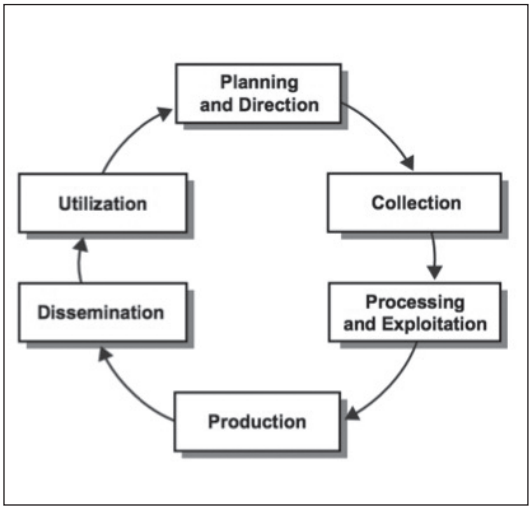

Figure 1.

Background and Status of USMC Data Analytic Network Systems

The use of data analytic network systems is a relatively new phenomenon in Marine Corps intelligence. They were adopted in response to the 2015 DOD Net-Centric Services Strategy, which established a Service-oriented approach to accelerating the ongoing effort to create organizationally available data assets and capabilities and establish an operational net-centric environment. This way, warfighters receive the right information, from trusted and accurate sources, when and where it is needed.

The service-oriented architecture represents the Marine Corps' response to the Net-Centric Services Strategy. It is a collection of software that will provide a common, open architecture for command and control applications across the MAGTF, with the goal of enhancing the sharing, shaping, and visualization of data within the MAGTF and within a joint environment. However, despite its limited testing in the 2015 exercise AGILE BLOODHOUND, the system lacks the fundamental abilities of Marines Corps intelligence, to aggregate, process, exploit, and analyze sensor data from across the battlespace.

Shortfalls of Current IW

The CBR data from 11th Marines' target processing center was a key component to the G-2's ability to conduct thorough analysis and generate timely and accurate intelligence assessments of the enemy during MEFEX 18. Throughout the exercise, G-2 Marines were collocated with Division fires, targeting Marines, which helped expedite the targeting process, improve data flow, and increase communications and situational awareness between the fires and intelligence sections. Historically, the Division G-2, and arguably the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE) as a whole, vastly underutilizes this highly valuable data set as a means to better generate the enemy's composition, disposition, and strength. However, as the G-2 section learned during the execution of MEFEX 18, the

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IW, the MCISRE's intelligence POR system for intelligence analysts, does not possess the suitable ability to ingest, analyze, and graphically depict CBR data in an automated and near-realtime mode. Nor does it possess the ability to adequately share the data or intelligence output across Marine Corps warfighting PORs.

Indeed, although IWs are specifically tailored to enhance intelligence analytics, they do not possess the organic software necessary for more modern, Information Age warfare analysis. Additionally, they do not possess the sufficient ability to visually display data as part of the common intelligence picture (CIP) that is compatible with other warfighting functional systems. In the absence of this capability, G-2 Marines are resigned to relying upon the command and control personal computer (C2PC) network system, which is arguably an inadequate adaptation of the IW baseline software or image for the modern operating environments.

C2PC, the Marine Corps' current data network system POR, is a Windows-based application used to share and edit the common operational picture. However, C2PC possesses limited analytic or data aggregation capabilities. It fails to fill the MCISRE's needs because of its inability to account for large analytic and intelligence data management gaps. Unquestionably, without a robust analytic network system to fill the G-2's need for crucial data aggregation, analysis, synthesis, and cross-warfighting functional interoperability, a large capability gap remains in the ability to conduct Marine Corps intelligence operations within the intelligence cycle. G-2 Marines are left to solve huge, difficult analytical problems through only their IWs and the current C2PC POR, thus significantly increasing the amount of time and effort necessary. This shortfall may result in missed opportunities for exploiting actionable intelligence during operations. These opportunities are generally fleeting in nature yet may prove to be crucial to the friendly force scheme of maneuver, and ultimately, in turn, they may increase risk to the force.

1stMarDiv's Solution to Filling the Data Analytic Gap

Utilizing the commercial data analytic platform, Palantir, G-2 Marines were able to reduce the time it took to tackle these difficult analytic problems by a few hours. Palantir, although not an official POR, demonstrated the functionality and capacity necessary to efficiently and effectively exploit CBR data, contributing to highly reliable and actionable intelligence throughout the exercise. The G-2 relied heavily on Palantir as a robust data analytic and graphical tool to maintain, update, and display the CIP, track and update enemy units, and pass and share information and data to various echelons up, down, and laterally across the MAGTF's intelligence formation. Most important was the system's ability to aggregate information from any format, whether through established databases, user input of data such as Excel spreadsheets, or via the continuous flow of reporting from the battlefield. The ability to quickly and intuitively map this data into objects and properties that could be linked with all the information within the operating environment was integral to the G-2's ability to improve its intelligence processes and speed up the decision-making cycle and sensor-to-shooter process. While Palantir may not be the Marine Corps' long-term solution, it is imperative that it adopts or continues the development of a similar solution to conduct the analytic and graphical work necessary for accurate, timely, and actionable intelligence.

A lack of interoperability and interconnectivity between the Advanced Field Artillery Tactical Data System (AFATDS), the fire support command and control network system POR, C2PC, and data analytic systems, such as Palantir, poses a challenge to maximizing the potential of this vital CBR data.

The Inability of the Cross-Functional Data Flow of Current PORs and Network Systems

Throughout the execution of MEFEX 18, the G-2 also identified significant limitations in the cross-functionality of current intelligence and fires PORs. Specifically, both intelligence and fires PORs lack the necessary capability to communicate and share data effectively in an automated and near-realtime mode. A lack of interoperability and interconnectivity between the Advanced Field Artillery Tactical Data System (AFATDS),[2] the fire support command and control network system POR, C2PC, and data analytic systems, such as Palantir, poses a challenge to maximizing the potential of this vital CBR data.

As the G-2 Marines learned as they tried to integrate the CBR data, moving the data from its origin point in AFATDS to a commercial system like Palantir posed a significant challenge. While the CBR data could be transferred cleanly from AFATDS to C2PC, the data was not transferrable to Palantir because of incompatible file types and the lack of synchronization between the systems. While C2PC is capable of transferring data to Palantir, modifications were made during the design process to synchronize the flow of data between the systems. The G-2 discovered that transferring the raw CBR data from AFATDS to C2PC to Palantir significantly distorted the data and prohibited any analysis or graphical display. This discrepancy of file types and the breakdown in CBR data flow from AFATDS to Palantir resulted in valuable time lost and opportunities missed because G-2 Marines had to convert the data into a Palantir-friendly format.

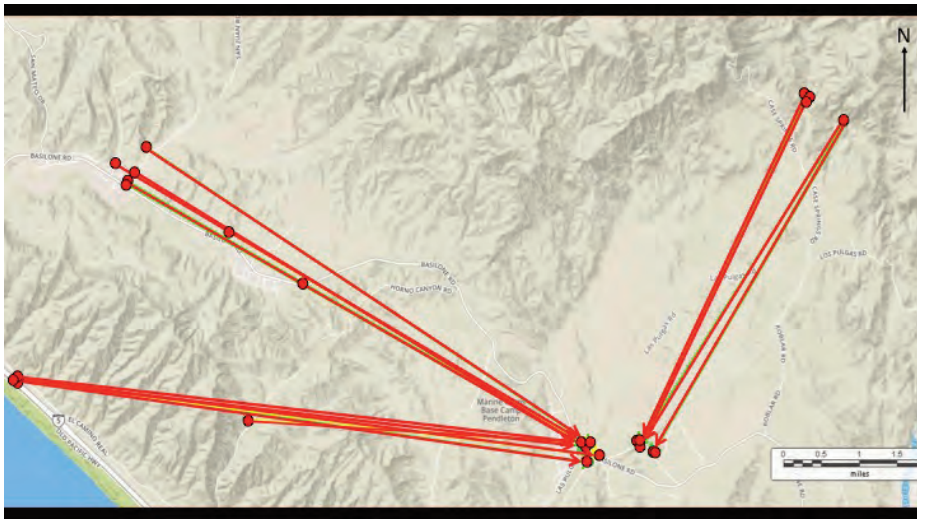
Because Palantir and other data analytic software provide a much-needed medium for predictive analysis to produce more accurate and actionable intelligence, the lack of interconnectivity between PORs and data analytic systems such as Palantir inhibits the ability to capitalize and leverage the valuable utility of CBR data gathered. Thus, as a lesson learned, the Marine Corps should prioritize the synchronization of PORs and systems as well as the standardization of file types and data flow in order to integrate, share, and communicate data cleanly and in a simple, timely manner. This seamless data flow will greatly augment communications and data flow up, down, and laterally throughout the MEF, thereby enhancing situational awareness. Thus, PORs and other programs contracted to support DOD operations need to be designed or have their software modified to ensure interoperability across systems, warfighting functions, and Services.

The G-2's Solution to the CBR Data Flow Problem

Despite the challenges that the G-2 faced in transferring and integrating the CBR data across PORs and data systems, the Marines improvised by establishing a detailed plan for information management and data integration during the execution of MEFEX 18. The G-2 discovered that to convert or upload data from AFATDS directly to Palantir, the CBR data can be leveraged through conversion from AFATDS to an Excel spreadsheet in order to manually import for use on Palantir via established processes and procedures. The data flow integration established detailed processes and procedures, including (1) timelines for data to be submitted via 11th Marines, (2) methods of dissemination (including SharePoint, email, and HF Tac Chat), and (3) specific data formats via Excel spreadsheets that G-2 Marines could easily translate and import into a data network system such as Palantir.

> ***... the Marine Corps should prioritize the synchronization of PORs ...***

In order to conduct the crucial predictive analysis using the CBR data, the G-2 identified the following essential properties that were crucial for 11th Marines to include in each CBR data rollup. The CBR data must include, at a minimum: a Military Grid Reference System of points of origin (POOs) and points of impact (POIs), the date and time of these POOs/POIs, the target number associated with unit/counterfire, the assessed enemy unit who fired, the type of indirect fire received (artillery, multiple rocket launcher, chemical,



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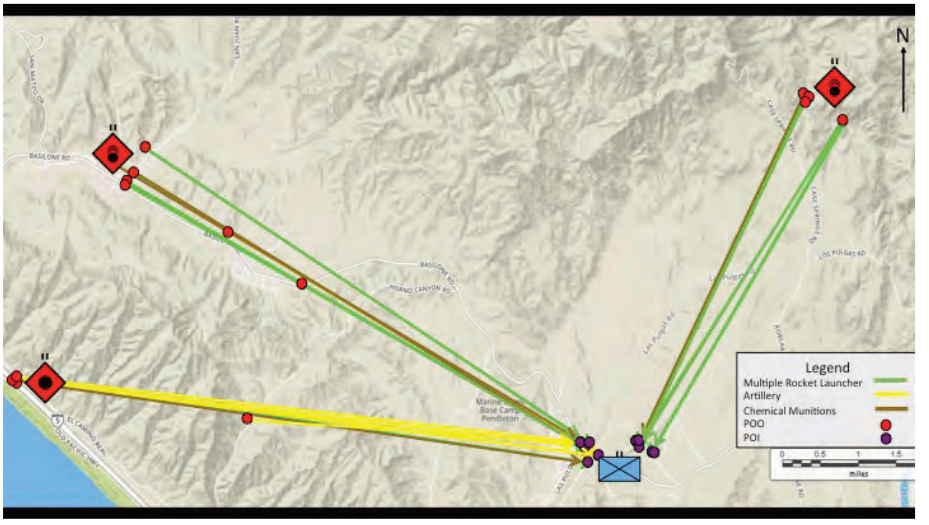

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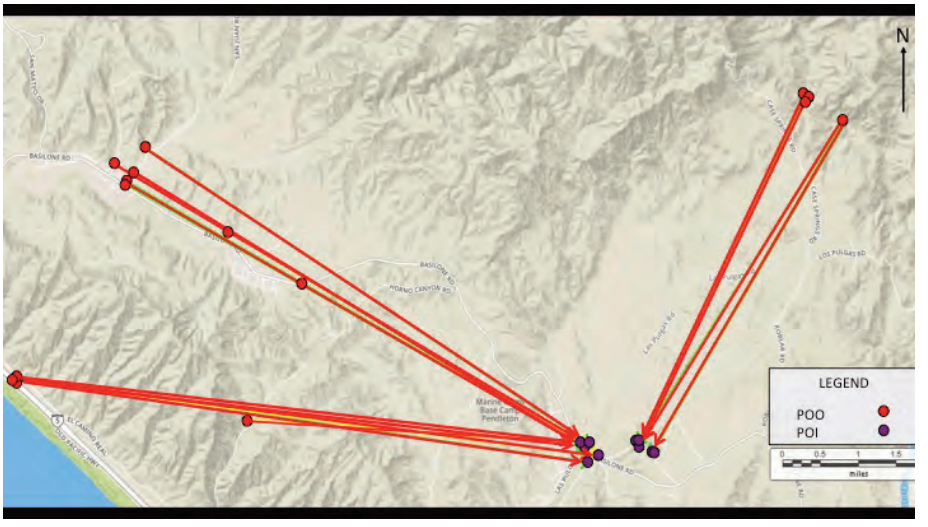

Figure 4.

etc.), and finally, the MIL2525 code for the assessed enemy firing unit.[3] By linking numerous essential properties to the POOs/POIs as a common entity, the Marines were able to improve and simplify analysis through the ability to track, filter, and analyze the data using Palantir.

To supplement the plan for CBR data integration during the exercise, the G-2 also established processes and procedures for integrating the CBR data flow within a denied or degraded environment. Specifically, the Marines identified methods for transferring the CBR data from 11th Marines over HF communications. They ensured that all the required specifics of the data were passed either through established data formats that could be sent on small .txt files via HF Tac Chat or through a "CBR Data Roll Up" via HF Voice. Because Palantir can operate off of an independent forward server, the ability to conduct the crucial CBR analysis was not inhibited by a denied or degraded environment or the loss of connectivity. As long as the CBR data could be pushed up from 11th Marines via HF means, G-2 Marines continued their analysis on Palantir without disrupting or slowing the intelligence cycle. Thus, as demonstrated by the G-2's use of Palantir in denied or degraded environments, it is imperative that the Marine Corps not only adopts a Palantir-like solution but adopts a system capable of operating through an independent network in austere denied or degraded environments.

Using the robust analytic features and tools of Palantir, the linking of these different properties to POOs/POIs demonstrated valuable utility in creating heat maps and depicting concentrations of enemy activity. In addition, the linkages provided reliable insight into the known, suspected, and likely enemy disposition of its lower echelons through a comparison of the adversary's doctrinal templates and inclusion in all-source analysis as a non-traditional sensor data stream. For example, by using the filter tool to look up a certain POO, the G-2 Marines were able to see its associated date-time-group, POI, and associated target numbers attached, as well as the

assessed enemy unit. As they learned throughout the exercise, the integration and analysis of this data gathered from the CBR has the potential to greatly augment the quality of collection and targeting efforts as well as the G-2's assessments and predictive analysis of enemy composition, disposition, tactics, techniques, and procedures (TTP), and SOPs. (See Figures 2, 3, and 4 (on previous page) for a step-by-step analysis of CBR data.)

Three Takeaways for Predictive Analysis Methods Using CBR Data on Palantir

Both the official Marine Corps PORs, AFATDS and C2PC, lack the ability to conduct robust predictive analysis using the critical CBR data. Throughout the execution of MEFEX 18, the G-2 learned that the aggregation of CBR data in a data analytic system, such as Palantir, provides invaluable tools for predictive analysis to improve the characterization of the enemy, aid in generating intelligence assessments, and ultimately speed up the decision-making cycle and sensor-to-shooter process. The three key takeaways that the G-2 identified using CBR data for predictive analysis included:

Identifying trends/SOPs/TTP of enemy indirect fire employment. Utilizing the Heat Map[4] application on Palantir, G-2 Marines analyzed and assessed enemy activity over time, sorted according to the concentration and frequency of enemy fire. This can be a valuable tool for predictive analysis to study patterns, trends, TTP, and SOPs of enemy units. Through an analysis of enemy fire over time using the Heat Map, G-2 Marines identified the highest concentration of originating enemy fire and gained valuable insight into how the enemy employed its fires and utilized different types of indirect fire and munitions (multiple rocket launcher/artillery and chemical, biological, radiological, and nuclear). They contributed to a highly reliable and accurate characterization of enemy indirect fire command and control. (See Figure 5.)

Improving collections and dynamic targeting. Predictive analysis of the POOs/POIs over time will improve the quality of collections and dynamic targeting. With the integration of date and time linked to each POO/POI, using tools such as the Heat Map in conjunction with the Timeline[5] and Time Wheel Tools,[6] G-2 Marines generated intelligence assessments reinforced by data of precisely when and where enemy activity was most likely to occur. These assessments were used to create, alter, and update collections plans and the dynamic re-tasking of collection assets to improve both deliberate and dynamic targeting through pre-strike target validation and post-strike battle damage assessment, ultimately speeding up the sensor-to-shooter process and directly enhancing the assessment phase of the targeting cycle. Analysis of the CBR data can also improve the collection of enemy units, including when and how an adversary leverages concealed positions or underground facilities. It can functionally characterize the underground facilities, identify which ones remain active, and help us to better understand adversary TTP and SOPs. For example, through sound analysis of the collected data, it may be deduced that an enemy unit fires from the same area every day, in the early afternoon, thus providing the targeting and collections cells the ability to refine and adjust the collections plan to collect and target the specific enemy unit in question. (See Figure 6.)

Improving fidelity on enemy identification and disposition. Along with the

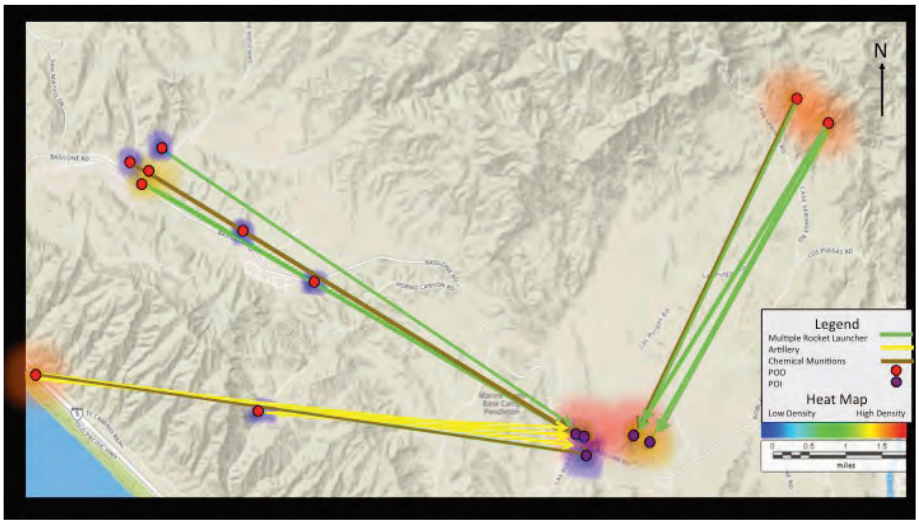

Figure 5.

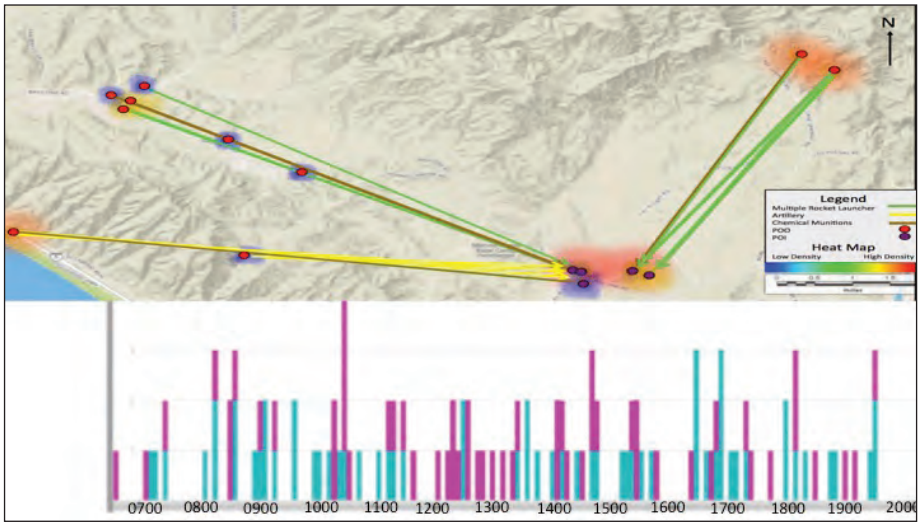

Figure 6.

Figure 7.

trends and patterns of enemy units, the CBR data also provided insight into specifics of the enemy units on the battlefield, such as the type of unit and its location. For example, by analyzing the various combinations of POOs/POIs, G-2 Marines can identify the range of the enemy's indirect fire and will be better equipped to make valid assessments regarding the type of equipment the enemy possesses and therefore the type of unit firing. In addition, by overlaying the enemy situation from the CIP with the POOs/POIs, G-2 Marines can improve their assessments of the location of subordinate enemy units. Utilizing enemy doctrinal templates of how the enemy arrays its forces, G-2 Marines can better analyze and assess the disposition of enemy forces, including enemy headquarter elements, lower echelon units, positioning areas for artillery, etc. (See Figure 7.)

Conclusion

As evidenced by the G-2's success throughout MEFEX 18, it is crucial for the MCISRE to capitalize on the valuable capabilities and insight that can be leveraged through the aggregation and analysis of CBR data. Through the utilization of this data, MCISRE analysts will significantly improve the ability to characterize the enemy, generate better intelligence estimates, and ultimately speed up the decision-making cycle and sensor-to-shooter process, supporting the targeting cycle. However, the ability to solve the difficult analytic problems of using the CBR data will rely on machine-assisted, human-driven analysis that can aggregate and integrate large quantities of data and analyze, synthesize, and exploit it in a timely manner. Thus, it is essential that the Marine Corps continues the development of a Palantir-like solution capable of integrating sensor data from non-traditional ISR platforms, including CBR, for data aggregation and predictive analysis and that is interoperable with other warfighting functions' current and future PORs. Although more thorough capability analysis is certainly required to more accurately identify capability gaps and requirements, the findings articulated in this article are offered for consideration as means to further develop a modern battlespace capability—one designed to help the Marine Corps maintain a qualitative edge in current and future fights.

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Notes

1. Intelligence Cycle in accordance with *MCWP 2-1, Intelligence Operations*, Chapter 1: Planning and Direction; Collection, Processing, Exploitation, and Production; Dissemination; Utilization.

2. The Advanced Field Artillery Tactical Data System (AFATDS) is the fire support command and control system employed by U.S. Army and U.S. Marine Corps units to provide automated support for planning, coordinating, controlling, and executing fires and effects.

3. MIL2525 codes are distinctive numerical codes that when uploaded into a network system, such as C2PC and Palantir, create the operational graphic, thus simplifying analysis and improving the CIP.

4. Heat Map is a map application in Palantir that illuminates the density or concentration of interesting objects on the map, such as the number of times an enemy fired from a specific location.

5. Timeline is a graph application in Palantir that visualizes the sequencing of events.

6. Time Wheel is a graph application in Palantir that provides understanding for the periodicity and frequency of repeating events.