THE NEW INTELLIGENCE CYCLE

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Ed Currie *reports on the importance of accelerating the path from detection to action*

The speed of the electronic warfare (EW) intelligence cycle has never been more important. With modern conflicts demonstrating how quickly the EW environment and technology can evolve, EW operators must be equipped to make fast, informed decisions based on clear, reliable intelligence. Here I explore how the time from detect to effect can be reduced, supporting operators and helping achieve information and operational dominance.

The intelligence cycle in EW follows a structured process that enables military and defence organisations to gather, analyse and act upon electronic signals intelligence (SIGINT) to gain operational advantage. While referred to as a 'cycle', the intelligence cycle is not simply a linear progression but a dynamic and continuous loop that requires adaptation to evolving threats and operational conditions. The intelligence cycle is formed of four key phases:

Direction – The initial stage is focused on defining EW objectives based on operational needs and identifying key adversary electronic systems such as radars, communication networks and jammers. This initial step is also crucial for establishing priorities and allocating EW assets – ground sensors, cyber tools *etc*.

Collection – This phase is focused on data collection, using EW sensors and platforms to intercept, locate and monitor enemy electronic emissions. Key collection methods include electronic intelligence (ELINT) from radar and electronic defence systems, communications intelligence (COMINT) from adversary voice or data communications and cyber electronic warfare integration through digital networks and RF-based cyber attacks.

Processing – This stage converts raw signal data into usable intelligence by characterising enemy electronic systems (via frequency and modulation encryption) and leveraging signal analysis to derive useful patterns.

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During this process EW data can be combined with broader intelligence for a more complete picture to help determine adversary intent, capabilities and vulnerabilities. This allows electronic order of battle (EOB) databases to be produced to support countermeasure development, tactics and planning.

Dissemination – The final step is to distribute the intelligence to decision-makers, command structures and tactical units. This ensures intelligence supports real-time operations and mission planning, enabling an effect (denial, degrading, disruption *etc*) to be decided.

The process of the intelligence cycle is crucial, particularly in modern conflicts with a rapidly increasing pace of warfare supported by advancing technology. The electromagnetic spectrum (EMS) is its own battlespace and forces need to be able to manoeuvre in this space as well as they do in land, sea or air to gain information dominance and advantage.

To do this it's vital to complete the intelligence cycle faster than your adversary. However, the increasing use of the EW spectrum for civilian technology – phones, radios *etc* – results in a battlespace that is congested and connected. Added to this is the development of countermeasures and counter-countermeasures makes the speed of decision-making paramount.

In this fast-paced environment, there are several factors that have influenced the time from detecting a signal to affecting a response. For example, as mentioned the dramatic increase in civilian technology since the Cold War era means that the spectrum is increasingly congested. Added to this is the ability for adversary's to better hide within this congested space, such as commercial radio station frequencies, making it more difficult for operators to quickly identify and determine what an emitter could be. Adversaries are also using sophisticated electronic camouflage techniques, such as frequency hopping and deceptive jamming, to further obscure their signals from detection.

The operator's ability to be able to visualise the EW spectrum is therefore extremely important and a key factor in the time from detect to effect. As emitters in the RF battlespace can't be seen with the eye being able to build this picture helps operators to better understand what is happening in the spectrum – for example, determining if the radar emitting is circular, horizontal or vertical. These characteristics help operators process information and improve their situational awareness, particularly when dealing with complex RF environments with multiple emitters to determine the potential emitter and turn it into actionable intelligence.

It's the analysis process that is often where the intelligence cycle slows due to the vast quantity of data that needs to be processed. But to stay at the forefront of the intelligence cycle and maintain information dominance, the right information needs to reach the right people at the right time. To achieve this, data pipelines must be optimised for speed and accuracy, ensuring only the most relevant intelligence is passed along while minimising information overload.

So how can we help reduce the burden on the operator and decrease the time from detect to effect? With the advancement of technology, and particularly machine learning – rather than artificial intelligence – we can support with information gathering and initial analysis, through for example eliminating 98 percent of possibilities. Using pattern recognition, machine learning can process information at the edge and alert the operator with a more manageable level of data. By leveraging automation, the established intelligence cycle processes can be sped up, providing operators with more time to make key decisions.

This ensures a human stays within the loop and has the ultimate responsibility and authority – whether that's identifying what the emitter is based on five potential possibilities or whether it's determining what resulting effect to take. Ensuring a balance between automation and human oversight is crucial to maintaining ethical and tactical control over EW operations. And this in my opinion will never change even as technology advances and gets more sophisticated.

THE HUMAN ELEMENT REMAINS PARAMOUNT AS TECH ACCELERATES DECISION-MAKING

EW operator training is therefore a core component of reducing the time from detect to effect, with knowledge and experience providing invaluable operational advantage. Operator training should offer rounded experience including training on the capability/technology itself, broader training on the electromagnetic spectrum environment and knowledge of the command-and-control structure.

Training on the EMS environment through simulated real-world scenarios supports with first-line analysis when monitoring at the edge. This type of training enables them to experience realistic signal environments in a controlled environment to refine their decision-making skills under pressure.

This provides operators with the knowledge to understand what is happening in the spectrum, visualise the battlespace in their head and reduce the number of possibilities when trying to identify a signal. This in-the-moment analysis can result in intelligence passing through the cycle quicker.

Added to this it's important for operators to have a full understanding of the command-and-control structure. While this typically involves comprehension of the roles above in terms of decision-making, to increase the speed of the intelligence cycle having an awareness of the role and responsibilities down the command chain is also helpful. This allows the effect decision to be made as close to the edge as possible, where the operator is closest to the potential impact.

The availability of civilian technology and the increasing congestion of the EMS means operators can leverage civilian technology on the ground, combined with artificial intelligence (AI), to have a quick effect. This can allow relatively small teams to deceive the adversary using low-cost equipment that can alter the course of a battle by using AI to spoof information.

Without reliance on a long logistics tail and operating at the edge, these on the ground operators can help secure marginal gains that increase the speed

of the intelligence cycle. Additionally, leveraging commercially available drones equipped with EW payloads can enhance intelligence collection and electronic attack capabilities, providing agile and cost-effective solutions for the modern battlefield.

DATA PIPELINES MUST BE OPTIMISED SO ONLY THE MOST RELEVANT INTEL IS PASSED ALONG

Beyond EW data collection and processing, it's important for the EMS battlespace to be supported and connected to wider intelligence gathering. With the rise of civilian technology in the RF spectrum, adversaries can use civilian locations such as hospitals and schools to hide RF emitters or make it look like there are RF emitters in the building. This information on its own can result in those buildings becoming military targets, which is why it's vital to incorporate visual and cyber data to corroborate initial intelligence findings.

Geospatial intelligence (GEOINT) and open-source intelligence (OSINT) are becoming increasingly relevant in Electronic Warfare operations. By combining real-time satellite imagery, social media monitoring and cyber intelligence with EW data, a far more holistic understanding of the battlespace can be achieved. This not only supports better situational awareness, but also builds a more accurate picture of the EMS.

In the modern battlespace, the speed at which the electronic warfare intelligence cycle operates can mean the difference between strategic advantage or operational vulnerability. To reduce the time from detect to effect, a combination of advanced technology, enhanced training, and seamless integration with broader intelligence efforts is essential. However, while technology plays a crucial role in accelerating decision-making, the human element remains paramount. EW operators must have the expertise and situational awareness to interpret intelligence effectively and act decisively.

As adversaries continue to develop sophisticated EW tactics, countermeasures and deception techniques, staying ahead in the intelligence cycle will require constant innovation. By enhancing the speed, accuracy and efficiency of EW intelligence processes, military forces can not only react to threats but proactively shape the battlespace to their advantage ●

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