

EARNING THE RIGHT TO MANOEUVRE

How Forces Create Windows of Opacity on the Modern
Battlefield

The first requirement was to make the battlefield lie.
The next is learning how to move while the enemy still believes the lie.

Executive Summary

The modern battlefield is increasingly difficult to manoeuvre across because military movement now produces an unprecedented number of observable signatures. Unmanned aerial systems, commercial and military satellite imagery, electronic intelligence, thermal sensing, acoustic detection, digital communications and rapidly connected precision fires mean that forces can be detected more frequently, across greater depth and at progressively lower cost. The consequence is not simply greater vulnerability once movement begins. Preparation itself can reveal intent. Logistics activity, engineering preparation, increased reconnaissance, radio traffic, vehicle concentration and changes in command behaviour can collectively indicate an operation before the manoeuvre force crosses its line of departure. [1][5]

This has encouraged the conclusion that persistent observation has rendered operational manoeuvre increasingly impractical. The argument of this paper is different. Manoeuvre warfare is not dead, but manoeuvre can no longer be assumed to be available simply because a force possesses sufficient combat power. Against a capable reconnaissance-strike system, armies must increasingly earn the right to manoeuvre by first creating an information condition in which the enemy cannot understand and respond to movement quickly enough to stop it. Ukrainian experience is particularly valuable because some higher-performing formations are already treating the battle against hostile reconnaissance, electronic warfare and supporting systems as a prerequisite for offensive action rather than as a separate protective activity. [1]

The objective is not battlefield invisibility. Against a sophisticated opponent, complete concealment is unlikely to be achievable for any meaningful period. Sensors are increasingly numerous, distributed and redundant, while electronic warfare and counter-UAS create their own adaptation cycles. Even where one collection method is degraded, another may continue functioning. The practical requirement is therefore more limited and more achievable: to create a temporary period in which the enemy's understanding of a specific portion of the battlefield becomes incomplete, delayed or incorrect. This paper describes that condition as a window of opacity.

A window of opacity does not require the enemy to become blind. Hostile sensors may continue detecting real movement. The decisive question is whether those observations can be converted into reliable understanding quickly enough to generate an effective response. Detection, classification, identification, tracking, communication, interpretation, decision and strike form a connected process. Disrupting any sufficiently important part of that process can create delay or uncertainty even when individual sensors continue operating. This is the basis of decision denial: the deliberate degradation of an opponent's ability to convert information into timely and reliable action.

Decision denial differs from conventional concealment because it does not depend solely upon preventing observation. It can also be achieved by making observations difficult to interpret, slowing their transmission, increasing the number of plausible explanations, generating false signatures, forcing additional confirmation, or moving before the enemy can complete its decision cycle. Modern deception therefore cannot be reduced to decoy vehicles or false positions. Against multisensor collection it must increasingly reproduce behaviour: visual activity, electronic emissions, logistics patterns, reconnaissance interest and command behaviour that together create a credible alternative explanation. Tactical deception literature in the United States has reached a similar conclusion, emphasising the need to create believable signatures inside a shortened sensor-to-shooter environment. [4]

The technical and organisational requirements for creating such a condition are broader than counter-UAS activity alone. Counter-reconnaissance must address the enemy information architecture as a system. Unmanned platforms, forward observers, electronic sensors, communications links, processing nodes, navigation dependencies and the relationships connecting reconnaissance to fires all contribute to the enemy's ability to understand the battlefield. Destroying a cheap reconnaissance platform may produce little operational effect if the operator, communications architecture and replacement systems remain intact. Conversely, temporarily degrading a critical communications relationship, interrupting confirmation, or forcing several sensor systems to produce conflicting explanations may create far greater delay. [1][2]

Electronic warfare is an important component, but not a standalone solution. The practical requirement is rarely complete electromagnetic dominance. More credible is local electromagnetic advantage: creating a limited period and area in which selected hostile communications, navigation or unmanned-system functions become less reliable while friendly forces retain enough connectivity to continue operating. This requires careful coordination because electronic warfare can interfere with friendly systems as readily as hostile ones. Recent RUSI and U.S. Army work both stress that electromagnetic manoeuvre, emissions control and signature awareness must be integrated with physical manoeuvre rather than treated as specialist activity conducted in parallel. [2][3][7]

Signature management supports the same objective. Modern formations reveal themselves not only through individual vehicles or soldiers but through patterns. Increased radio activity, logistics movement, reconnaissance flights, engineering preparation and concentration can collectively expose intention. Commanders must therefore consider not only whether equipment is concealed, but whether the behaviour of the formation is generating a recognisable operational pattern. The U.S. Army's recent emphasis on emissions control and spectrum situational awareness reflects this problem: connectivity is valuable, but every emission can also become a cue for hostile collection. [3][5][8]

Terrain, weather and timing remain fundamental because battlefield transparency is not uniform. Open ground, vegetation, urban clutter, relief, weather and the local electromagnetic environment all change what can be observed and how reliably. A force that understands this sensor geography can combine naturally weak observation periods with deliberate disruption. Permanent concealment is unnecessary if the force can create enough uncertainty at the decisive point for enough time.

This places reconstruction time at the centre of practical manoeuvre planning. Reconstruction time is the estimated period required for the enemy to rebuild a sufficiently coherent understanding after its reconnaissance and decision system has been disrupted, deceived or distracted. It is not a precise mathematical value and should not be treated as one. Its value is comparative. Manoeuvre becomes more credible when the period during which the enemy is likely to remain uncertain

exceeds the period during which friendly forces must remain especially exposed. In practical terms, the force is attempting to make the enemy's information cycle slower than its own movement cycle.

This has direct consequences for concentration and command. Forces that assemble early provide the enemy with time to detect a coherent pattern and react, so future manoeuvre may require formations to remain dispersed longer and concentrate later, once favourable information conditions have been created. At the same time, a formation trying to reduce its electronic signature may have to accept periods of reduced friendly connectivity. Headquarters cannot demand continuous high-bandwidth reporting from every subordinate while also expecting a minimal signature. Mission command, pre-planned decision points, rehearsed contingencies and subordinate initiative therefore become practical enablers of opacity rather than abstract command philosophy. [3][5]

The paper concludes that temporary battlefield opacity is achievable. It will not be perfect, permanent or guaranteed. The enemy will adapt, replacement sensors will appear, communications will recover and false indicators will eventually be recognised. The relevant question is not whether the lie survives forever but whether it survives long enough to influence the decisions that matter. It is possible to create local, temporary windows in which persistent observation does not produce sufficiently rapid understanding. When those windows are deliberately manufactured and exploited before the enemy reconstructs reality, manoeuvre becomes viable again.



Figure 1. Manufacturing the Window: a practical sequence for converting enemy uncertainty into a temporary opportunity for manoeuvre. The aim is not permanent blindness, but a local period in which hostile understanding falls below the level required for effective response.

1. From Problem to Method

The expression battlefield transparency is useful only if it is not taken literally. Contemporary commanders do not possess perfect vision, and neither do their opponents. Sensors fail, weather interferes, terrain masks movement, networks become congested, reports arrive late and people make mistakes. The change is more important than simple visibility: considerably more activity can now be observed by more systems, more often, and linked to fires quickly enough that movement which was previously merely risky can become prohibitively exposed. RUSI's work with Ukrainian formations describes this as one of the central reasons why conventional concentration and surprise have become difficult. [1]

The operational consequence is that the manoeuvre problem begins well before the manoeuvre force starts moving. A battalion can reveal itself through the pattern of activity required to prepare. Fuel vehicles shift location, engineering support becomes active, reconnaissance concentrates on particular areas, communications traffic changes, air defence moves, medical arrangements expand and commanders begin visiting subordinate positions. None of these observations alone has to expose the plan. When several appear together, however, they create a story that the enemy can recognise.

A practical method therefore has to control more than physical movement. It has to influence the enemy's explanation of what that movement means. Counter-UAS, electronic warfare, deception, signature management, terrain and timing become parts of one manoeuvre problem because each changes either what the opponent can collect or the confidence with which it can interpret collection. The force is not trying to remove every hostile eye. It is trying to prevent enough eyes from agreeing quickly enough to produce an actionable picture.

This paper uses a fictional southern Ukrainian operation to show how that can work. The vignette is deliberately grounded in the broad environmental problems of the Huliaipole area - open agricultural ground, tree belts, dispersed settlements, limited concealed approaches, persistent unmanned observation and responsive fires - but it does not reproduce current dispositions, routes, vulnerabilities, frequencies or tactical plans. The unit names, geography, timings and events are fictional. Their purpose is to make the concepts visible at the level where commanders and soldiers must actually act.

2. Sector Halyna

The brigade staff calls the fictional area Sector Halyna. On the map it appears deceptively uncomplicated: broad fields separated by windbreaks and tree belts, several damaged villages, minor roads and agricultural tracks, and a shallow rise that dominates much of the central ground. The terrain does not prevent movement. That is part of the problem. Anything large enough to matter can also become visible from several directions once it leaves cover.

Russian observation in the sector is layered rather than continuous. Tactical unmanned systems watch selected areas, forward observation positions cover likely approaches, electronic collection provides warning when communications behaviour changes, and other sensors contribute confirmation at greater depth. None produces perfect coverage. Together they are sufficiently persistent that a Ukrainian force which assembles conventionally is likely to reveal itself before its movement can create operational surprise.

Lieutenant Colonel Sergiy Prokhorenko's battalion has been assigned a limited brigade task. It must reposition combat power across part of the exposed sector and establish a new tactical situation from which the brigade can continue manoeuvre. Prokhorenko understands that the physical movement is not the first problem. The first problem is whether the defending brigade can recognise the movement early enough to concentrate effects against it.

VIGNETTE / UKRAINIAN VIEW | 03:40 - The Map Before the Movement

The operations shelter is almost silent when Prokhorenko arrives. Rain has stopped during the night and water still glistens along the folded edges of the map. Major Yulia Prykhodko is standing over a second display that looks less like a conventional enemy overlay than a tangle of circles, lines and fading time stamps. She has spent much of the night with the reconnaissance cell, comparing what appeared over the sector with when it appeared and, just as importantly, when it did not.

Prokhorenko asks the question that has been bothering him since the brigade order arrived: if the battalion moves, how quickly will the Russians understand what they are looking at? Prykhodko does not answer with the number of drones in the air. She traces a sequence instead. One system usually detects movement. Another tends to confirm it. A report then appears elsewhere, often after a short delay, and Russian fires become noticeably more alert. 'They don't have to see everything,' she tells him. 'They only have to become confident before we finish moving.' The room stays quiet for a moment because the problem is now clearer and, in some ways, more difficult.

3. Map How the Enemy Sees

Prykhodko's first contribution is to stop the staff treating hostile reconnaissance as a list of platforms. A list is useful for inventory, but manoeuvre depends on relationships. One cheap UAV may be replaceable within minutes. A forward observer may be useful because it confirms what another sensor has seen. A communications relay may matter because several reconnaissance elements depend upon it. A processing node may be more important than the aircraft that feeds it. The question is not simply where the sensors are, but how the opponent normally moves from detection toward confidence.

For planning purposes, the staff describes this sequence as the enemy observation cycle. The term is intentionally simple and is not presented as formal doctrine. It means the recurring pattern by which an opponent detects activity, seeks confirmation, communicates what has been seen, interprets it within an existing hypothesis and decides whether it requires action. The observation cycle may be different for a company-sized movement, an artillery position, a command post or a logistics node. What matters is understanding which links create speed and confidence.

This distinction changes target value. A sensor that is visible is not automatically the most useful thing to disrupt. An action that removes one platform but does not alter the enemy's overall response time may produce a satisfying tactical result without creating manoeuvre space. By contrast, disrupting a less visible link that several collectors rely upon may increase latency across the entire process. The practical measure of counter-reconnaissance therefore becomes additional uncertainty and delay rather than the raw number of systems destroyed.

The same logic explains why passive collection and spectrum awareness matter. RUSI describes electronic intelligence as a central means of tracking activity and unmanned systems in Ukraine, while the U.S. Army is fielding spectrum-awareness tools specifically to help commanders understand their own emissions and local electromagnetic conditions. [1][8] A commander who does not understand what his formation looks like in the spectrum is managing only part of the battlefield signature.



Figure 2. The same battlefield can support competing explanations. Decision denial is achieved when the opponent continues to collect information but cannot assign the correct meaning to it quickly enough to act.

VIGNETTE / RUSSIAN VIEW | 04:10 - Morozov's Baseline

Major Alexei Morozov begins the morning with a picture that is incomplete but comfortable. Ukrainian units occupy the areas he expects. Road movement looks routine. Several reconnaissance flights have appeared and disappeared without creating an obvious pattern. His job is not to know everything. It is to recognise when normal behaviour changes enough to demand attention.

A junior analyst points to a minor increase in activity west of one of the villages. Morozov marks it but does not elevate it. One movement is not a plan. He has learned to distrust dramatic interpretations built from a single sensor. What interests him are correlations: movement that coincides with different radio behaviour, engineering activity, changes in reconnaissance and signs that logistics is beginning to support something larger. The strength of his system lies not in any one feed but in the moment several feeds begin telling the same story.

4. Build a False Story

If several mutually reinforcing signatures allow Morozov to recognise a real operation, then deception has to compete at the same level. A visual decoy may draw a drone briefly, but against multisensor collection it is unlikely to carry an entire operational explanation. The more useful objective is to construct a false pattern whose components make sense together. The enemy should see activity that appears to have purpose, not simply objects placed for effect.

This is why modern deception is behavioural. A false story can include visible movement, changes in electronic activity, apparently purposeful reconnaissance interest, logistics behaviour and command signatures that together support a plausible interpretation. The story does not have to be complete, and it does not have to make the opponent absolutely certain. It only needs to increase the number of plausible explanations enough that the real one takes longer to confirm. U.S. Army analysis of deception in the contemporary targeting environment makes a similar point: decoys and false signatures are most valuable when they generate credible targeting or intelligence behaviour rather than appearing as isolated props. [4]

The concept can be described as confirmation burden. Confirmation burden is the amount of independent evidence the opposing intelligence system must reconcile before it becomes sufficiently confident that one interpretation is correct. If every observable activity reinforces the genuine axis, the burden is low. If meaningful indicators point toward more than one explanation, communications are less reliable, and some sensors are intermittent, the same genuine movement becomes harder to interpret quickly.

VIGNETTE / UKRAINIAN VIEW | 05:20 - Building Something That Does Not Exist

Sergeant Artem Melnyk has spent the last several hours helping to create an operation that will never happen. Nothing about the work feels theatrical. There are no rows of perfect dummy vehicles waiting beneath a spotlight. Instead, the deception grows slowly enough to resemble normal military preparation. A few movements are allowed to become visible. An apparent command pattern emerges. Engineering activity makes sense in the same area. Radio behaviour changes just enough to suggest that somebody important has begun paying attention.

Pilot Officer Denys Davydov sits two workstations away, watching the brigade's own unmanned activity. His contribution is restraint. A false story can become unbelievable if the brigade suddenly floods one area with reconnaissance that bears no resemblance to how it normally behaves. Davydov adjusts where possible so that friendly aerial activity supports the narrative without shouting it. Melnyk glances at the screen and jokes that the hardest part of lying convincingly is remembering how the truth usually looks. Prykhodko, passing behind them, does not smile. That is exactly the problem.

VIGNETTE / RUSSIAN VIEW | 06:00 - A Plausible Explanation

By sunrise, Morozov has more information and slightly less certainty. Several indicators are now clustering around an area that had appeared quiet the previous day. None is conclusive. Together they are difficult to ignore. He does what a competent intelligence officer should do: he builds a hypothesis, records what would confirm or disprove it, and asks for additional collection.

That decision is the first meaningful effect of the deception. Morozov has not been tricked into announcing an attack that does not exist. He has simply decided that one possibility deserves more attention. From Prykhodko's side of the battlefield, the shift is visible in Russian behaviour. More collection begins looking in the wrong place. She cannot know what Morozov believes, but she can see where he is spending attention. The deception has not yet created opacity; it has begun competing for the resources from which clarity is built.

5. Create Local Electromagnetic Advantage

Captain Anna Danylchuk's problem is different from Melnyk's but inseparable from it. She coordinates the battalion's electronic-warfare and electromagnetic-support effort. Her task is not to create permanent spectrum dominance across Sector Halyna. That would be both unrealistic and unnecessary. The useful objective is local electromagnetic advantage: a temporary condition in which selected hostile functions become less reliable in the area and period that matter to the manoeuvre while friendly command-and-control remains adequate.

This limited definition matters because electronic warfare affects both sides. Jamming hostile communications can also interfere with friendly communications and unmanned systems. Navigation disruption can degrade friendly precision and control. High-power emitters can reveal themselves. RUSI's work on competitive electronic warfare and Ukrainian combined-arms practice repeatedly emphasises the requirement to deconflict electronic effects with the systems the manoeuvre force itself depends upon. [1][2]

Emissions control is the complementary discipline. U.S. Army writing defines EMCON as selective and controlled use of electromagnetic, acoustic and other emitters to preserve command-and-control while reducing detection, mutual interference and vulnerability to enemy action. Recent Army work also stresses an uncomfortable trade-off: formations cannot demand continuous digital visibility of every subordinate while simultaneously expecting a small electronic footprint. [3][5]

This makes spectrum awareness a command problem, not simply an EW-specialist problem. A battalion commander needs to know when reduced connectivity is acceptable, which reports can wait, which systems must remain available and when a burst of friendly activity may be worth the signature it produces. The objective is not silence for its own sake. It is disciplined use of the spectrum in service of manoeuvre.

VIGNETTE / UKRAINIAN VIEW | 07:05 - Danylchuk's Invisible Terrain

Danylchuk's display contains almost none of the terrain that occupies Prokhorenko's map. Her battlefield is made of emissions, coverage, interference and gaps. She points to several hostile functions that matter during the coming movement and then to the friendly systems that cannot simply be turned off. The overlap is uncomfortable. Every measure that makes one part of the Russian picture less dependable risks making a Ukrainian system less dependable as well.

She tells Prokhorenko that she can probably make the relevant part of the spectrum more difficult for the enemy for a period, but refuses the word dominance. 'We don't own it,' she says. 'We can make it unpleasant.' The battalion commander nods. The distinction is enough. He does not need ownership of the electromagnetic spectrum; he needs Morozov to spend longer deciding whether the information reaching him is complete.

6. Preserve the Operational Story at the Lowest Echelon

The deception plan can be designed at brigade level and still be destroyed by ordinary behaviour at platoon level. This is why signature management has to become fieldcraft rather than a specialist activity. A private soldier does not need to understand the entire operational deception, but that soldier can still create the radio transmission, visible cluster, thermal pattern or movement cue that provides the enemy with the missing piece of confirmation.

The same principle applies to command posts and logistics. A formation may hide its manoeuvre vehicles successfully while revealing intent through the sudden appearance of support activity. A headquarters that reduces visual signature but continues transmitting on predictable schedules may be tactically concealed and electronically obvious. Modern signature management therefore requires attention to correlation: whether separate parts of the formation collectively behave in a way that tells the enemy what is about to happen. [3][5]

Mission command becomes increasingly important because reduced signature often means reduced connectivity. A platoon that cannot function without continuous detailed direction will either emit when it should remain quiet or lose effectiveness when communications are disrupted. Rehearsal, clear intent, known decision points and subordinate initiative are therefore not merely leadership virtues. They are practical elements of survivability and deception.

VIGNETTE / UKRAINIAN VIEW | 07:40 - Hnatiuk in the Tree Line

Private Taras Hnatiuk lies motionless beneath wet branches and watches a distant structure through gaps in the leaves. His patrol has been there long enough for the cold to work through his gloves. The suspected Russian observation position is not dramatic. A shape appears occasionally, an antenna becomes visible when the light changes, and activity rises at roughly the same times other hostile collection becomes more noticeable elsewhere.

The patrol does not attack simply because it has found something. Hnatiuk's task is to help establish whether the position matters to the wider observation cycle. He notes another short period of activity, and the report eventually reaches Prykhodko. Later, during the period that matters to the manoeuvre, the position ceases contributing useful reporting through means the vignette does not specify. The tactical act is intentionally unglamorous. Hnatiuk has helped remove one piece of confirmation from Morozov's puzzle, and that missing piece is valuable only because several other pieces will become uncertain at the same time.

7. The First Window Fails

A serious concept must include failure. If opacity is treated as something that appears automatically once enough enabling activities are scheduled, commanders will confuse planning confidence with battlefield reality. The opponent is adaptive, redundancy exists and conditions change. A window therefore has to be recognised, not assumed.

The battalion's first attempt is deliberately unsatisfactory. Deception is attracting attention and some hostile collection has become intermittent, but Prykhodko's assessment is that Russian understanding is recovering more quickly than expected. Kozlov's company requires longer to complete its most exposed movement than the staff believes the uncertainty will last. Danylchuk also sees signs that the opposing network is adapting around some of the disruption.

The scheduled movement time arrives without the required information condition. Prokhorenko holds. This decision is tactically frustrating because many activities have been synchronised around the planned period, but it demonstrates an essential principle: a window of opacity is a condition, not a timetable. The commander's responsibility is to recognise whether the condition exists and to refuse movement when it does not.

VIGNETTE / DUAL PERSPECTIVE | 08:15 - The Window That Was Not There

In the Ukrainian shelter, Prykhodko watches several Russian indicators reappear almost together. The pattern is not complete, but it is becoming coherent too quickly. Kozlov's company is ready and the battalion has already absorbed the cost of preparation, yet Prokhorenko cancels the release. There is irritation on the company net, quickly contained. The commander gives no long explanation. The condition has changed, and that is enough.

Across the sector, Morozov has no idea that an attack has just been postponed. From his perspective the morning simply becomes easier to understand. A feed returns. Another report confirms an earlier observation. Several uncertainties begin collapsing into a more familiar picture. He does not know that he has closed a Ukrainian opportunity; he only knows that his own confidence is recovering. The same event therefore looks like restraint to one headquarters and routine reconstruction to the other.

8. Reconstruction Time and the Two Clocks

The failed attempt forces the battalion to make its estimate of enemy reconstruction more explicit. Reconstruction time is the period required after disruption, deception or distraction for the enemy to rebuild a sufficiently coherent picture to support effective action. It is not the time required to restore every sensor, nor is it the time required to understand the entire battlefield. The threshold is operational: when can the opponent again understand enough to interfere effectively with the manoeuvre?

This estimate depends on redundancy, communications, operator capacity, weather, terrain, the quality of deception, the number of contradictory indicators and the behaviour of the manoeuvre force itself. It is therefore never exact. What makes it useful is comparison with friendly exposure time. If the friendly force needs longer to complete its vulnerable movement than the opponent is likely to need to reconstruct an actionable picture, the operation is poorly conditioned. If uncertainty can be extended beyond the friendly exposure period, manoeuvre becomes more credible.

The relationship can be understood as two clocks. One clock measures how long the friendly force requires to concentrate late, cross the exposed period, achieve the necessary tactical effect and disperse. The other measures how long the enemy requires to move from disrupted collection through uncertainty toward pattern recognition and actionable understanding. Counter-reconnaissance, deception, electronic warfare and signature management exist in this model to slow the second clock. Rehearsal, late concentration, disciplined command and efficient movement exist to shorten the first.

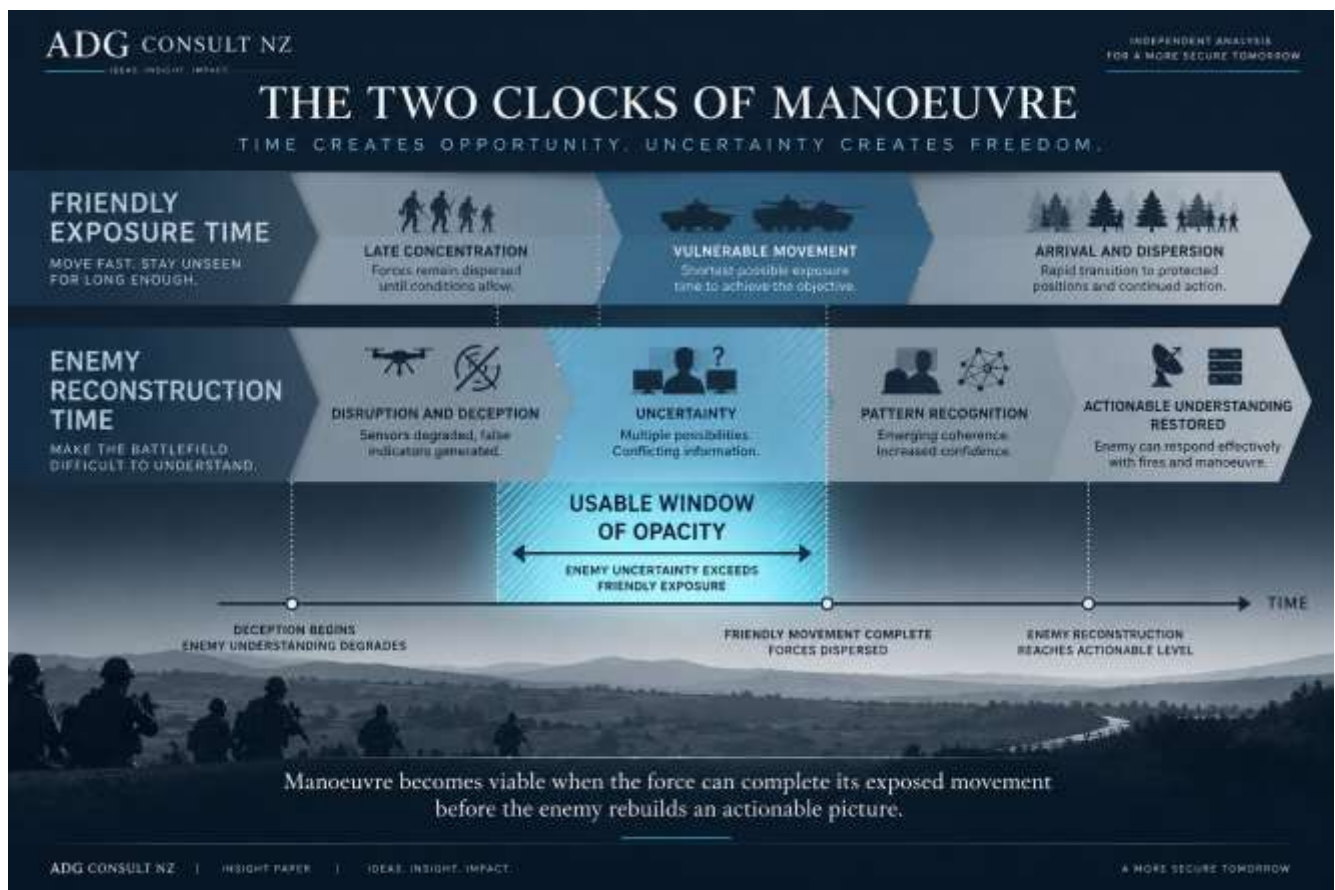


Figure 3. The Two Clocks of Manoeuvre: manoeuvre becomes viable when the friendly force can complete its vulnerable movement and disperse before enemy reconstruction reaches an actionable level.

9. Increase the Confirmation Burden

The second attempt does not simply repeat the first with more electronic warfare or more decoys. The staff changes the information problem presented to Morozov. The purpose is to increase confirmation burden by keeping more than one explanation plausible for longer. Melnyk's false pattern therefore continues rather than escalating into something obviously theatrical, while Davydov ensures that friendly unmanned activity does not suddenly contradict the story. Danylchuk prepares another period in which selected hostile functions are expected to become less reliable, and Prykhodko shifts part of her attention from enemy locations to enemy collection behaviour.

This last point is important. A formation cannot read the enemy's mind, but it can often observe what the enemy is doing. Sensors moving toward one area, changes in electronic activity, altered fires behaviour or repeated collection against a false sector can provide indirect evidence about what the opponent considers important. Deception assessment should therefore focus less on the impossible question 'Do they believe us?' and more on the observable question 'What are they doing because of what they currently believe?'

The resulting opacity is cumulative. No single measure is decisive. Some sensors remain effective. Some Russian observers see real Ukrainian activity. Other reports are accurate but delayed. False indicators remain plausible. The information architecture is still functioning, but its outputs no longer converge quickly on one explanation. This is the condition the battalion is trying to create.

VIGNETTE / RUSSIAN VIEW | 10:05 - More Evidence, Less Certainty

Morozov has more reports on his screen than he did two hours earlier, yet he trusts the overall picture less. Activity in the false sector still looks meaningful. A separate report elsewhere appears important but lacks the confirmation he expects. One feed is intermittent. Another arrives late enough that its time stamp matters almost as much as its content. He asks for another look and receives the answer that the relevant system is temporarily unavailable.

Nothing in the situation tells Morozov that deception is underway. The battlefield simply feels noisier. He keeps two hypotheses alive and resists the temptation to collapse them prematurely. That discipline makes him a more difficult opponent, but it also consumes time. The Ukrainians do not need him to make an absurd decision. They need him to remain professionally uncertain while Kozlov's company begins doing something that will eventually make the correct explanation obvious.

10. Late Concentration

Captain Oleg Kozlov's company remains dispersed for longer than would be administratively comfortable. That is deliberate. Concentration is still necessary because combat power has to become coherent at the decisive point, but early concentration gives the enemy time to recognise the formation, allocate additional collection and prepare a response. The practical adaptation is not permanent dispersion. It is concentration as late as the situation allows.

Late concentration exchanges administrative certainty for information advantage. Orders have to be issued earlier, contingencies rehearsed, routes understood and subordinate commanders trusted. Some of the organisational work normally conducted inside an assembly area must occur before the force physically comes together. The company then converges while moving rather than assembling first and waiting to move as a complete targetable pattern.

This principle should not be turned into dogma. Terrain, mission, training and logistics may require different arrangements. The useful question is whether the benefit of early concentration justifies the signature and time it gives to enemy reconstruction. When observation is persistent, concentration itself becomes an act that requires protection.

VIGNETTE / UKRAINIAN VIEW | 10:30 - The Second Release

The second opportunity arrives without ceremony. No screen turns green and no sensor disappears from the map. Instead, several small indicators align. Russian collection remains divided. Danylchuk reports that the relevant electromagnetic conditions are favourable enough. Melnyk's false activity continues drawing attention without looking overworked. Weather has reduced the quality of some observation, and the real company has still not produced the coherent assembly pattern Morozov would normally expect.

Prokhorenko asks Prykhodko how long she believes the uncertainty will last. She gives him a range rather than a promise. Kozlov answers a different question: how long his company needs if nothing unexpected stops it. The two estimates overlap in the right direction. Prokhorenko looks once more at Danylchuk, then at Prykhodko, and releases the company. The decision is not based on confidence that the enemy is blind. It is based on the judgement that the enemy is late.

11. Move Under Reduced Connectivity

Lieutenant Pavel Danyluk receives a short release rather than a continuous stream of new direction. His platoon has already rehearsed what it is expected to do, which decisions it can make independently and what conditions require it to stop or seek clarification. This is mission command expressed as electromagnetic discipline. The platoon is able to function with fewer transmissions because understanding was created before the window opened.

The higher headquarters temporarily knows less about the precise location and status of every subordinate element than it would prefer. This is intentional. Information denied to the enemy may sometimes require information restraint within the friendly system as well. The trade-off is acceptable only if subordinate commanders possess enough shared understanding to continue acting responsibly without constant digital supervision. [3][5]

At the individual level, the requirements are ordinary and therefore easy to underestimate. Soldiers maintain camouflage, avoid unnecessary clustering, follow rehearsed movement and resist the urge to use communications simply because connectivity is available. These acts do not create operational opacity alone, but they preserve the larger story long enough for other effects to matter.

VIGNETTE / UKRAINIAN VIEW | 10:42 - Danyluk Moves

The release reaches Danyluk as a short burst and then the net becomes quiet again. He already knows what Kozlov expects, so the absence of a running commentary does not feel like loss of control. Vehicles that had spent the morning separated begin moving with purpose, each element joining the larger action later than Morozov would have preferred to see it. The company is becoming a company at the same time it is moving, rather than revealing itself as one long beforehand.

Hnatiuk sees little of the information battle from ground level. What he notices is the discipline it demands. A vehicle that stops in the wrong place begins attracting others; he waves the next one onward rather than allowing a convenient cluster to form. Somewhere above the tree line a drone can probably see parts of the movement. The plan never promised invisibility. It promised that what was seen would take time to make sense.

12. What the Enemy Sees Is Not Necessarily What the Enemy Understands

Sergeant Denis Volkov's reconnaissance system eventually detects real Ukrainian movement. This is not a failure of the concept. Decision denial does not require every hostile observer to miss the manoeuvre. It requires the information to enter an environment in which its meaning remains uncertain long enough to delay effective action.

Volkov can accurately report vehicles without knowing whether they represent a main effort, reinforcement, local repositioning, reconnaissance or part of the deception already being examined elsewhere. Morozov's staff has to interpret the report against everything else it currently believes. The false sector is still generating evidence. Some supporting feeds remain intermittent. The report is important, but it is not yet decisive.

This is the crucial distinction between detection and understanding. A force that measures concealment only by whether it was seen will miss a large part of the information battle. Operational surprise can survive initial detection if the opponent misjudges timing, scale, purpose or direction. Conversely, a force can remain visually concealed while revealing intent through communications and logistics. The practical objective is not absence of observation but control of interpretation.

VIGNETTE / RUSSIAN VIEW | 10:51 - Volkov Sees Something Real

Volkov's feed catches movement between two areas that had appeared quiet. He follows it long enough to become confident that the activity is genuine and sends the report. In another context the observation might have clarified everything. Instead it lands in front of Morozov beside a collection of competing clues. The activity could be the beginning of the main effort, but it could also be support to the operation that already appears to be developing elsewhere.

Morozov asks for confirmation from another source and does not receive it immediately. He is not paralysed; he redirects attention. That decision is already later than it would have been on a cleaner battlefield. Volkov has succeeded as a sensor operator. The Ukrainian operation is surviving because success at the sensor has not yet become success at the decision level.

13. Reconstruction Begins

Uncertainty does not last. Additional observations begin correlating with Volkov's report. Activity in the genuine area persists instead of disappearing. Russian collection shifts back. The false sector remains visible, but its significance begins to look different. Morozov is not discovering that everything he saw earlier was fabricated; he is reassigning meaning to largely genuine observations that had been arranged into the wrong explanation.

From the Ukrainian side, Prykhodko does not hear Morozov change his assessment. She sees reconstruction indirectly. Collection behaviour changes. Systems that had been interested elsewhere return. Electronic activity becomes more purposeful around the real movement. Separate reports suggest that the Russian picture is beginning to cohere. She tells Prokhorenko that reconstruction has started.

At this point the window of opacity should be understood as a depreciating battlefield resource. From the moment it opens, the opponent is working - deliberately or through ordinary reconnaissance processes - to close it. Every unnecessary minute of exposure consumes part of the advantage created by hours of preparation.

VIGNETTE / DUAL PERSPECTIVE | 11:02 - The Picture Comes Back

Prykhodko notices the change before anyone announces it. Russian attention that had been spread unevenly across the sector begins tightening around Kozlov's movement. 'They're rebuilding,' she tells Prokhorenko, and the phrase is passed to the operations staff without drama. Nobody needs a percentage. The direction of travel is enough: the enemy's uncertainty is shrinking.

Morozov reaches the same moment from the opposite side. Volkov's report has gained confirmation. Activity in the area he considered secondary is becoming coherent, while the sector that had consumed much of his attention no longer explains everything he is seeing. He does not suddenly understand every detail, but he understands enough to change priority. In his headquarters, reconstruction feels like clarity returning. In Prokhorenko's, it feels like time running out.

14. Tempo Is a Race Between Understanding and Action

The window changes the meaning of tempo. Speed by itself is not manoeuvre, and moving as fast as possible can create its own failures. The relevant measure is whether the friendly force can achieve the necessary effect before the opponent's understanding catches up. A formation moving at moderate physical speed can possess high operational tempo if the enemy remains consistently behind its decision cycle. A formation moving rapidly while the enemy understands every step may possess little meaningful information advantage.

This means that tactical efficiency directly supports decision denial. Rehearsed movement, late concentration, clear commander's intent and simple contingencies shorten friendly exposure time. Deception, counter-reconnaissance, electromagnetic disruption and signature control extend enemy reconstruction time. Manoeuvre exists in the gap between them.

The gap is finite. Once Morozov's assessment becomes actionable, Kozlov's company cannot behave as if the conditions that protected the movement still exist. Exploitation and dispersion therefore have to be planned before the window opens, not invented after the force arrives.

15. Arrival Is Not the End

A formation that successfully manoeuvres through a window and then remains concentrated has merely postponed its vulnerability. Arrival generates new signatures: vehicles occupy new ground, command relationships adjust, communications may increase, logistics routes change and supporting systems begin serving the new disposition. The enemy's recovering reconnaissance architecture now has a fresh problem to solve, and the friendly force should make that problem as difficult as possible.

Dispersal therefore belongs inside the manoeuvre sequence rather than after it. Command functions shift, unnecessary emissions remain controlled, the company avoids creating an obvious static footprint and the broader deception is not terminated simply because the physical movement has succeeded. There is no reason to tell Morozov precisely when his earlier explanation became wrong.

This continued information competition is what converts movement into manoeuvre. The objective was never simply to move vehicles from one location to another. It was to place the opponent in a situation where its understanding and dispositions were no longer appropriate. Physical movement matters because the information battle allowed it to occur; the information battle matters because the movement creates a new dilemma.

VIGNETTE / RUSSIAN VIEW | 12:10 - Morozov Understands Too Late

By midday Morozov can explain much of what happened. The apparently independent indicators in the false sector now look less independent. Temporary gaps that seemed like ordinary battlefield friction align too neatly with the period of Ukrainian movement. His staff reconstructs the sequence and identifies several points at which a different allocation of collection might have changed the result.

The retrospective picture is considerably better than the one he possessed when the decision mattered. That is the final lesson of the deception. It does not have to remain convincing forever. Morozov can understand the operation perfectly several hours later and still have been denied the understanding he needed during the critical period. The lie has already done its work.

16. What Each Echelon Contributes

The vignette is useful only if the responsibility for creating opacity can be separated across echelons. Brigade creates the wider information condition. It is the echelon most capable of coordinating deception, counter-ISR, electronic warfare, air defence, unmanned systems, fires and supporting effects across enough space to influence what the opponent believes. Its task is not to guarantee a window for every subordinate, but to make local windows possible.

Battalion owns the local decision. Prokhorenko has to determine whether brigade effects have actually created a usable opportunity in his area. Prykhodko's understanding of the enemy observation cycle, Danylchuk's assessment of electromagnetic conditions, Kozlov's readiness and the estimate of reconstruction time collectively inform that judgement. The battalion shapes and recognises the window, then decides whether to commit.

Company controls concentration and exposure. Kozlov cannot manufacture the brigade's information environment, but he can determine how long his force remains dispersed, when it becomes a coherent visible pattern, how much communications activity is required and whether movement can be completed inside the expected window. Company discipline determines whether a theoretically favourable condition becomes practical freedom of movement.

Platoon preserves the plan in execution. Danyluk's platoon cannot run a brigade deception, but it can avoid contradicting it. The platoon can function under reduced connectivity, maintain movement discipline and execute rehearsed actions without generating unnecessary indicators. The individual soldier controls the smallest signatures from which larger patterns are eventually constructed. Hnatiuk's camouflage, emissions discipline and behaviour therefore have a direct relationship with Prokhorenko's operational surprise.



Figure 4. Who Creates the Window? Brigade shapes the wider information condition, battalion judges and shapes the local opportunity, company controls concentration and exposure, platoon executes with discipline, and individual soldiers preserve the operational story through fieldcraft and signature control.

17. Technical Requirements for a Force That Wants Manoeuvre Back

Reconnaissance and Sensor Understanding

A force cannot manipulate an enemy reconnaissance system it does not understand. The requirement is therefore broader than locating UAV launch points or counting observed platforms. Brigade and battalion staffs need a persistent model of how hostile collection behaves, which sensors appear to confirm one another, where coverage is naturally weak, how quickly observations become decisions and what changes when parts of the system are disrupted. This model should combine visual reconnaissance, electronic support, historical fires and targeting behaviour, friendly incident reporting and analysis of recurring enemy patterns. [1][2]

The technical requirement is not necessarily a single sophisticated platform. It is fusion. Cheap sensors, passive collection, reports from lower echelons, unmanned systems and spectrum awareness become far more valuable when the formation can compare them across time. The purpose of the resulting picture is not simply to find targets. It is to identify the opponent's information dependencies and estimate how quickly the system can recover when disturbed.

Electronic Warfare and Spectrum Awareness

Electronic warfare must be integrated into manoeuvre planning early enough that its effects can be deconflicted with friendly communications and unmanned systems. Competitive EW is now an all-arms concern because every formation depends upon the electromagnetic spectrum while also creating signatures inside it. [2] A battalion needs the ability to understand its own electromagnetic footprint, recognise hostile interference and adjust emissions according to the threat and mission rather than treat communications settings as fixed administrative defaults.

The U.S. Army's recent emphasis on spectrum situational awareness reflects this requirement. Systems designed to show commanders their own electromagnetic signature and sources of interference are intended to support EMCON decisions and improve survivability. [8] The broader lesson is organisational: commanders need visibility of the spectrum in the same way they expect visibility of terrain, weather and logistics, because spectrum conditions can determine whether a physical movement remains ambiguous or becomes obvious.

Counter-UAS and Protection

Counter-UAS is necessary but should be understood as part of counter-reconnaissance rather than a separate defensive contest. NATO's current layered counter-UAS experimentation reflects the need to integrate multiple detection and defeat methods rather than rely on one interceptor or jammer. [6] The relevant manoeuvre question is whether counter-UAS activity produces a useful gap in hostile observation at the time and place the formation intends to move.

This has economic as well as tactical implications. A force cannot afford to defeat every inexpensive sensor with an expensive interceptor. Some systems should be destroyed, some disrupted, some deceived and some simply tolerated because their observation can be made less useful elsewhere in the chain. The desired output is not a clean sky. It is reduced enemy confidence and increased response time.

Deception and Multispectral Signature Control

A practical deception capability requires more than decoy hardware. Formations need people who understand how the enemy collects, planners able to construct plausible alternative explanations and the ability to reproduce enough visual, electronic, thermal and behavioural evidence for those explanations to survive initial scrutiny. [4] Deception should be rehearsed as part of combined-arms activity rather than added as an information-operations annex after the manoeuvre plan is already complete.

The most demanding requirement is coherence. A false command post with no associated electronic activity may be less persuasive than an imperfect decoy supported by realistic behaviour. Equally, an elaborate electronic deception can fail if visual activity contradicts it. The force does not need to replicate every signature, but it needs to understand which signatures the enemy normally uses to confirm meaning and ensure that the false story does not collapse immediately when those sensors are compared.

Low-Signature Command and Control

The force must be capable of command under reduced emissions. Recent U.S. Army analysis from Ukraine emphasises tactical communications survivability, rapid adaptation, smaller footprints and disciplined signature management in a highly lethal environment. [5] This does not mean abandoning digital command systems; it means having reporting rules, alternate methods and mission-type orders that allow units to reduce transmission when the tactical situation demands it.

Headquarters should therefore train to function with less information than technology makes theoretically available. Commanders need to decide which information is essential for immediate action and which can be delayed. Subordinates need enough context to continue when the network is degraded. Without this organisational resilience, the formation will either emit excessively to maintain control or become paralysed when it attempts to reduce signature.

Rapid Adaptation and Training Feedback

Opacity is temporary partly because the enemy adapts. Frequencies change, reconnaissance routes move, replacement systems appear and deception patterns become familiar. The force therefore requires an adaptation cycle fast enough to change procedures during the campaign rather than wait for formal doctrine or procurement. NATO's recent counter-UAS experimentation and U.S. Army Transformation in Contact initiatives both reflect the same institutional problem: the technology and tactics of sensing and counter-sensing are changing too quickly for long acquisition cycles to remain the sole answer. [6][8]

Training must capture these changes systematically. Every exercise and operation should generate information about how long friendly formations remained ambiguous, which signatures produced enemy attention, how quickly opposing

reconnaissance recovered and which friendly procedures failed under reduced connectivity. The goal is not merely to record lessons. It is to shorten the formation's own adaptation cycle so that yesterday's successful deception does not become tomorrow's predictable pattern.

18. Turning the Concept into a Brigade Planning Cycle

The practical value of the concept lies in making it part of the brigade planning cycle rather than a special activity conducted only when a deception team happens to be available. Before an operation, the brigade should establish the enemy observation cycle, identify which signatures normally reveal friendly intent, decide what alternative explanation it wants the opponent to consider, and determine which reconnaissance or communications relationships need to become less reliable. The manoeuvre plan and the information plan should therefore be developed together, because the force cannot decide how it will move without also deciding what the enemy is expected to believe while that movement is being prepared.

During shaping, the brigade should look for evidence that the information environment is changing in the intended direction. This does not mean searching for proof that the enemy has been 'fooled'. The better indicators are behavioural: collection shifting toward a false area, confirmation becoming slower, hostile reconnaissance becoming more fragmented, or an increase in the number of plausible explanations the opposing staff must carry. If those effects are absent, additional activity may simply create more signatures without creating more uncertainty.

The battalion then converts those broader effects into a local assessment. Its staff should estimate how long the information advantage is likely to survive, compare that with the company or platoon exposure period, and decide whether friendly communications can function under the emissions discipline required. The release should therefore be linked to conditions as well as time. A planned H-hour can remain useful for coordination, but it should not become more authoritative than the battlefield information on which the manoeuvre depends.

Once movement begins, the planning cycle does not stop. The formation should watch for signs of reconstruction and understand that the information advantage is being consumed. Subordinates need pre-rehearsed options for continuing, pausing, dispersing or changing behaviour when that advantage begins to disappear. The end of the movement should immediately become the beginning of the next signature problem: how to sustain, command and support the force without giving the enemy an easy new picture.

After the operation, the brigade should reconstruct both sides of the information contest in the same way it would reconstruct fires or manoeuvre. The critical questions are when the enemy detected genuine activity, when it correctly understood that activity, which false indicators attracted attention, which friendly signatures unintentionally confirmed the truth, and how long the opponent required to restore an actionable picture. That analysis turns opacity from a clever concept into a repeatable capability.

19. The Commander's Practical Test

The commander does not need another complicated dashboard. The useful test is whether enemy observation has actually become less useful, whether hostile attention is divided, whether the opponent's reports are still converging on a coherent explanation, whether enemy response time has been pushed beyond friendly movement time, whether friendly command-and-control can function under the signature restrictions being imposed, and whether reconstruction has already begun.

These questions cannot produce certainty. They produce a structured judgement. The commander is not waiting for a perfect battlefield; such a battlefield will rarely exist. The decision is whether the current information balance is favourable enough that the operational gain justifies the remaining risk. This is why the first failed window in Sector Halyna matters. Prokhorenko does not prove the concept by moving every time the plan says a window should exist. He proves it by refusing to move when the evidence says it does not.

Go or no-go criteria should therefore include the information environment rather than focus only on physical readiness. A company can be fuelled, rehearsed, loaded and tactically prepared while the manoeuvre conditions remain unacceptable. Conversely, a brief information opportunity can appear before the administrative situation is perfectly comfortable. Commanders and staffs need the discipline to distinguish readiness from opportunity and the agility to align the two.

20. Training for Opacity

The concept will remain theoretical unless it is trained against an opposing force that can actually observe. Exercises designed around manoeuvre under persistent sensing should give the opposing force unmanned reconnaissance, simulated electronic collection, thermal and visual sensors, and responsive simulated fires. The training force should then be evaluated not only on whether it reaches an objective but on when the opposing force correctly identifies the main effort.

After-action review should reconstruct the information battle. When did false indicators attract attention? Which friendly emissions created useful enemy cues? At what point did several weak indicators combine into a recognisable pattern? How long did reduced connectivity remain tolerable before it damaged friendly command? When did the enemy's picture become actionable again? These questions turn deception and signature management into measurable training problems rather than specialist activities that disappear behind the exercise scenario.

The most revealing question may be simple: at what point did the enemy correctly understand what we were doing? A force that was visually detected early may still have achieved operational surprise if the opponent misread the purpose or timing. A force that remained unseen until the last moment may nevertheless have failed if its logistics and emissions revealed the operation hours earlier. Training must therefore judge understanding, not merely detection.

21. Failure Modes and Limits

The concept has obvious failure modes. A commander may mistake several absent drones for meaningful opacity while other collection remains effective. Electronic warfare may degrade the enemy while simultaneously reducing friendly control below

an acceptable level. A deception may look convincing visually but fail because the electronic or behavioural signature is wrong. Logistics may betray a manoeuvre that combat units successfully concealed. A company may delay concentration but require so long to organise after release that the window closes before movement is complete.

There is also a danger of making the concept too deterministic. Reconstruction time cannot be calculated with engineering precision. Intelligent opponents deliberately preserve alternatives, test hypotheses and adapt. Morozov remains difficult in the vignette precisely because he does not accept the first explanation presented to him. A real opponent may recover faster than expected, or a sensor considered irrelevant may suddenly provide decisive confirmation. The concept therefore supports command judgement; it cannot replace it.

Nor does successful opacity guarantee tactical success. Mines, fires, terrain, mechanical failure, logistics, morale and direct combat remain. The claim is narrower: manipulating the enemy's information environment can restore the possibility of manoeuvre that persistent observation would otherwise suppress. Once the window opens, the force still has to fight well enough to exploit it.

Conclusion

Armies will not regain manoeuvre by recreating a battlefield on which significant movement can routinely occur unseen. Against a capable opponent, that battlefield is unlikely to return. Sensors are becoming cheaper, more numerous and more persistent; communications and processing increasingly connect those sensors to decisions; autonomous functions reduce dependence on uninterrupted control links; and commercial systems add collection that conventional forces may not be able to remove.

The practical answer is to attack the enemy's understanding rather than chase perfect invisibility. That begins with mapping how hostile observation actually becomes confidence. It requires deception that creates credible alternative explanations, electronic warfare that produces useful local advantage, emissions control that reduces self-generated cues, counter-UAS that is tied to manoeuvre timing, terrain and weather exploitation, and command structures capable of functioning when connectivity is deliberately constrained.

The result sought is temporary and local. A window of opacity exists when the enemy can still collect information but cannot turn it into a sufficiently accurate and timely explanation to interfere effectively with movement. Reconstruction time then becomes one of the commander's critical considerations. The friendly force has its own clock: how long it needs to concentrate late, complete its exposed movement, achieve the necessary effect and disperse. The enemy has another: how long it needs to move from disrupted collection through uncertainty toward actionable understanding. Manoeuvre becomes viable when the first clock can finish before the second.

The fictional operation in Sector Halyna shows why the concept has to exist at every echelon. Brigade creates the wider information condition. Battalion recognises and shapes the local window. Company controls concentration and exposure. Platoon executes under reduced connectivity and preserves ambiguity. The individual soldier contributes through fieldcraft and signature discipline. On the other side, an intelligent opponent is continuously trying to rebuild reality from imperfect evidence.

Prokhorenko does not succeed by making his battalion invisible. Volkov eventually sees real movement. Morozov eventually understands what happened. The Ukrainian advantage is narrower and more realistic: for a limited period, the enemy cannot assign the correct meaning quickly enough. That period is sufficient for Kozlov to move, for Danyluk to execute without continuous direction, for Danylchuk's local electromagnetic effects to matter, for Melnyk's false story to consume attention and for Prykhodko to recognise the moment before certainty returns.

This is the practical meaning of earning the right to manoeuvre. The contest is not between visibility and invisibility. It is between understanding and uncertainty, and between the time required to move and the time required to reconstruct reality. A force that can control that relationship can restore surprise, concentration and tempo even inside a battlespace saturated by sensors.

The previous paper argued that the battlefield of the future may be impossible to hide but still possible to make it lie. The follow-on requirement is more demanding because the lie is useful only if the force can act before it collapses.

The first requirement was to make the battlefield lie.

The next is learning how to move while the enemy still believes the lie.

SOURCE NOTES

References and Source Notes

This Insight Paper is an open-source tactical-operational assessment. The operational vignette is fictional and is designed to illustrate concepts rather than reproduce any current Ukrainian or Russian plan, disposition or vulnerability. Source notes support the technical and doctrinal discussion; the fictional events, names, timings and decisions are illustrative. Assessment cut-off: 10 September 2026.

[1] Jack Watling, 'Emergent Approaches to Combined Arms Manoeuvre in Ukraine,' Royal United Services Institute, 23 October 2025. The paper draws on engagement with Ukrainian formations and describes battlefield transparency, counter-reconnaissance, electronic warfare, survey and isolation activity, and emerging approaches to restoring combined-arms manoeuvre under persistent observation. <https://www.rusi.org/explore-our-research/publications/insights-papers/emergent-approaches-combined-arms-manoevre-ukraine>

[2] Jack Watling and Noah Sylvia, 'Competitive Electronic Warfare in Modern Land Operations,' Royal United Services Institute, 30 January 2025. The study examines the electromagnetic spectrum as an all-arms concern and the implications of electronic warfare for modern land force design and manoeuvre. <https://www.rusi.org/explore-our-research/publications/occasional-papers/competitive-electronic-warfare-modern-land-operations>

[3] Ryan McGovern, 'Adapting to the Multi-Domain Battlefield: Developing Emissions Control SOP,' U.S. Army / Armor, 2025. The article discusses emissions control, communications resilience, deception support and the tension between robust command-and-control and signature reduction. https://www.army.mil/article/284546/adapting_to_multi_domain_battlefield_developing_emissions_control_sop

[4] Paul Dolan, 'Like Moths to a False Flame: Lethality and Protection through Deception Operations,' U.S. Army, 8 July 2025. The article examines tactical deception in a sensor-to-shooter environment and the use of false signatures to divert or misdirect adversary collection and targeting. https://www.army.mil/article/286861/like_moths_to_a_false_flame_lethality_and_protection_through_deception_operations

[5] Josiah Turner, 'Tactical Communication Survivability in the Hyper-Lethal Battlespace,' U.S. Army, 31 July 2026. The paper translates observations from Ukraine into recommendations concerning tactical communications, signature management, decentralised adaptation and survivability in a sensor-dense environment. https://www.army.mil/article/294285/tactical_communication_survivability_in_the_hyper_lethal_battlespace

[6] NATO Allied Command Transformation, 'Military and Industry Unite to Advance NATO Counter Drone Capability through LCI-X 3-26,' 13 August 2026. The activity reflects NATO's continuing effort to integrate layered and interoperable counter-UAS capability into battlefield manoeuvre. <https://www.act.nato.int/article/lcix-3-26/>

[7] U.S. Army, 'Spectrum Maneuver: Integrating Electromagnetic Spectrum Operations into 21st Century Warfare,' 2026. The article discusses temporal windows created by electromagnetic action, emissions discipline and the relationship between spectrum manoeuvre and physical freedom of movement. <https://www.lineofdeparture.army.mil/Journals/Gray-Space/Archive/Summer-2026/Spectrum-Maneuver/>

[8] U.S. Army Capability Program Executive - Intelligence and Spectrum Warfare, Spectrum Situational Awareness System material, 2026; and Military Intelligence Professional Bulletin, 'Transformation in Contact and Military Intelligence: Rewiring Collection, Fusion, and Survivability for the Modern Battlefield,' 2026. These sources describe the Army's emphasis on electromagnetic signature awareness, lower digital footprints, distributed sensing and survivable command-and-control. <https://cpeisw.army.mil/pm-ewc/> and <https://mipb.ikn.army.mil/jul-dec-2026/transformation-in-contact-and-military-intelligence/>