PROLIFERATED DRONES

Game of Drones

Wargame Report

Introduction

Drones are rapidly proliferating around the globe. Not only has the commercial market for drones dramatically expanded, but arms transfers of unarmed and armed drones between states are also steadily rising.[1] The United States and its allies must consider how the widespread availability of drones will change conflict, particularly in ambiguous engagements that remain below the threshold of conventional war. They also must anticipate how actors will use drones and how others will respond to those uses.

In October 2015, the Center for a New American Security held a two-day wargame entitled Game of Drones at the National Defense University to explore the implications of a world of proliferated drones.[2] The wargame brought together a diverse group of experts from the U.S. and allied militaries, academia, think tanks, media, and international organizations. Participants represented a range of actors, from major nation-states to non-state groups, across a dozen multi-turn scenarios.

The wargame found that although existing drone technology is relatively simple, the availability of drones can have important tactical, strategic, and political implications across the spectrum of conflict. Drones increase the options available to state and non-state actors to apply military force where they might not have had the resources or will to act without access to uninhabited ("unmanned") technology. This increased optionality is particularly impactful in so-called "hybrid" and "gray zone" conflicts, the types of ambiguous interactions short of full-scale war that are typical in today's security environment.

Already, more than 90 countries and non-state actors operate drones.[3] The use of drones by increasing numbers of states and non-state actors will have a growing impact on strategy and policy as they expand and complicate the spectrum of conflict. The optionality provided by drones has started to change behavior within the international system with initial, observed effects on crisis stability, escalation dynamics, and norms regarding sovereignty violation.[4]

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Furthermore, the sophistication of uninhabited aircraft and the number of countries employing them is likely only to increase as the commercial market for drones expands, states build more robust indigenous industries, and technology advances. More operators of more capable and, increasingly, weaponized drones will heighten the ambiguity that already characterizes drone use and increase the severity of consequences from misinterpretation and miscalculation.[5]

Limiting the spread of this technology is neither practical nor probable with the growth of commercial drones, international sales by drones exporters such as Israel, China, and even the United States, and increases in indigenous production.[6] Given these conditions, understanding how various actors will choose to employ drones and respond to their use is a critical step in preparing for the challenges of a drone-saturated world. Considering how to adapt strategically and politically to this new reality early on will mitigate the dangers of decisionmaking in the midst of crises and create an opportunity to shape the long-term evolution of drone use.

About Gameplay

Over the course of two days, four teams representing fictitious actors played through 12 multi-turn scenarios. Game of Drones included two major power teams, a minor power team, a non-state actor team, and representatives from the International Committee of the Red Cross (ICRC) charged with observing gameplay. Each team consisted of the same six to eight participants

throughout the wargame. While each team's role (such as major power) remained constant, the fictitious actor it represented varied from one scenario to the next to introduce a wide variety of strategic and political variables. Game design pitted teams against each other in one-on-one match-ups such that every team played two scenarios against each of the other teams.

Teams played up to four moves within each scenario. Moves lasted for 30 minutes with 20 minutes allotted to teams for deliberation of actions and 10 minutes to control officers for adjudication of the move. During adjudication, control officers compared teams' actions and determined the most realistic outcome. At the end of each move, control officers communicated their conclusions to each team. This cycle repeated for all subsequent moves within a scenario. Shorter one- to two-move scenarios often required teams to take action quickly, anticipating the actions of their adversary, whereas longer gameplay allowed teams to test the responses of their adversary or set up capabilities for future use.

While fictional, the scenarios emulated modern security settings ranging from low-intensity conflict and irregular warfare to conventional military engagements. The wargame challenged teams to conduct stand-off attacks against more powerful adversaries, make shows of strength supporting claims in contested geographic environments, intervene in foreign wars to hasten regime change, employ information operations to gain control over the narrative, and even carry out deniable attacks in sovereign territory. Teams responded to the conditions of each scenario according to current norms of state behavior and employed only military assets based on existing technologies. Controlling these variables allowed CNAS to focus gameplay on operational concepts and the thinking behind them across a broad range of contingencies.

Each day of play concluded with a plenary session during which participants reflected on whether access to drones significantly impacted the concepts of operation their teams employed or their ability to achieve political or military objectives. ICRC participants also presented their observations on how teams used drones throughout gameplay within the context of evolving norms of drone use and international humanitarian law. The final plenary session focused the discussion on comparing the utility of drones among different actors and contexts, identifying game-changing technological developments, and predicting likely trajectories of future drone use.

Findings: Use Cases

Game of Drones was designed to explore how various actors might employ drones, whether drone use differs significantly from traditional airpower, and how drones will impact state behavior and power dynamics. Specifically, the wargame sought to draw out concepts of operation unique to the capabilities of drones, the thinking behind them, and likely responses to drone use within various realistic scenarios. The wargame challenged teams to take action in contexts ranging from verification of treaty compliance, counterterrorism operations, and special forces raids to competing territorial claims and major power interventions.

Teams had access to drones – from small commercial drones to sophisticated military-specific ones – based on existing technologies and their role as major nation-states, minor states, or non-state actors. Teams also had access to traditional military assets they could use to achieve their aims. The choice of whether or not to use drones in each scenario and how to employ them was left up to the participants.[7]

While participants almost always chose to include drones in their operational concepts, more often than not, they were used in conjunction with traditional capabilities. In a few cases, participants noted that access to drones had little to no impact on their success or failure in achieving their political or military objectives. These scenarios typically required teams to take decisive action and demonstrate resolve, resulting in the use of traditional systems as the more effective means of messaging in conflict.

In most scenarios, drones significantly expanded teams' options and shaped the types of operational concepts they developed. The following cases present the main archetypes of drone use observed during the wargame:

Drones increased the capabilities available to non-state actors.[8] Non-state actors experienced higher marginal utility from access to drones. Adding drones to their arsenal provided them

capabilities they did not have with traditional military assets. As with other actors, commercial drones also gave non-state groups potentially deniable assets because of their widespread availability.

The non-state actor team was given access to a variety of small hobbyist drones and midsize military and commercial drones that could conceivably be purchased or provided by a state sponsor, depending on the scenario.

Battle Damage Assessment

The non-state actor team launches unguided rockets against their adversary. Drones are deployed to observe the adversary's response and to collect targeting intelligence on military installations and other potential targets.

The non-state actor team continues drone surveillance over their adversary's territory. They identify whether any targets were destroyed in the first strike and relay more accurate targeting intelligence back to their operators to conduct a second strike.

Based on the drones' battle damage assessment and new targeting intelligence, the non-state actor team launches a second attack correcting fire.

Drones were used by the non-state actor team in a variety of ways:

- Small commercial drones were armed with explosives and used to launch attacks on civilian, government, and military targets from standoff distances.

    - This type of use maximized the impact of attacks, causing confusion and inflicting mass casualties, and offered the non-state actor team some increased force protection by not putting their forces directly at risk.
    - In one scenario, the non-state actor prepositioned commercial drones strapped with explosives in order to launch targeted strikes against a state adversary. This allowed them to carry out strikes even while under persistent surveillance by their state adversary, which had denied them the ability to use rockets from their territory without compromising their position. The improved force protection gained by using prepositioned autonomous commercial drones allowed the non-state actor to conduct a more sustained campaign of attacks at reduced risk.
- Midsize military and commercial drones were used to collect targeting intelligence on adversaries' military assets to conduct kamikaze strikes or launch guided munitions if they were available. After initial strikes, drones were used to conduct battle damage assessment operations.
    - This use case demonstrated the use of drones to replicate traditional capabilities. Drones allowed the non-state team to act more quickly on intelligence and improve precision.
- Small and midsize drones were used to capture and transmit propagandist video footage of attacks and messages from central leadership.
    - The "live-feed" aspect of drones' video capabilities enhanced the intended impact of events, particularly terrorist attacks. The video added to the chaos and confusion of attacks on civilian targets and increased perceptions of the group's strength.

Drones reduced tactical risk to state actors, but heightened strategic and political risks. Because uninhabited aircraft do not put pilots in harm's way and are generally less expensive than human-inhabited counterparts, they gave actors the option to use force in many situations where they might have previously been reticent to take action. State teams often viewed drones as a relatively expendable resource to carry out operations that, if conducted using human-inhabited aircraft, might have been prohibitively risky or costly. As a result, drones changed the calculus surrounding the use of force, lowering the threshold for military action in some circumstances because the perceived risk was lower.

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However, while the use of drones lowered the tactical risk of operations, it heightened secondary strategic and political risk, as it increased the likelihood of engaging in conflicts in the first place – particularly in contested geographic areas and ambiguous conflicts that fell short of conventional war.

In the wargame, state actors included teams representing major and minor powers. Teams were provided access to midsize military and commercial drones and large military-specific drones according to the represented state's capabilities.

Additional operational concepts highlighting risky behavior by state actors included the following:

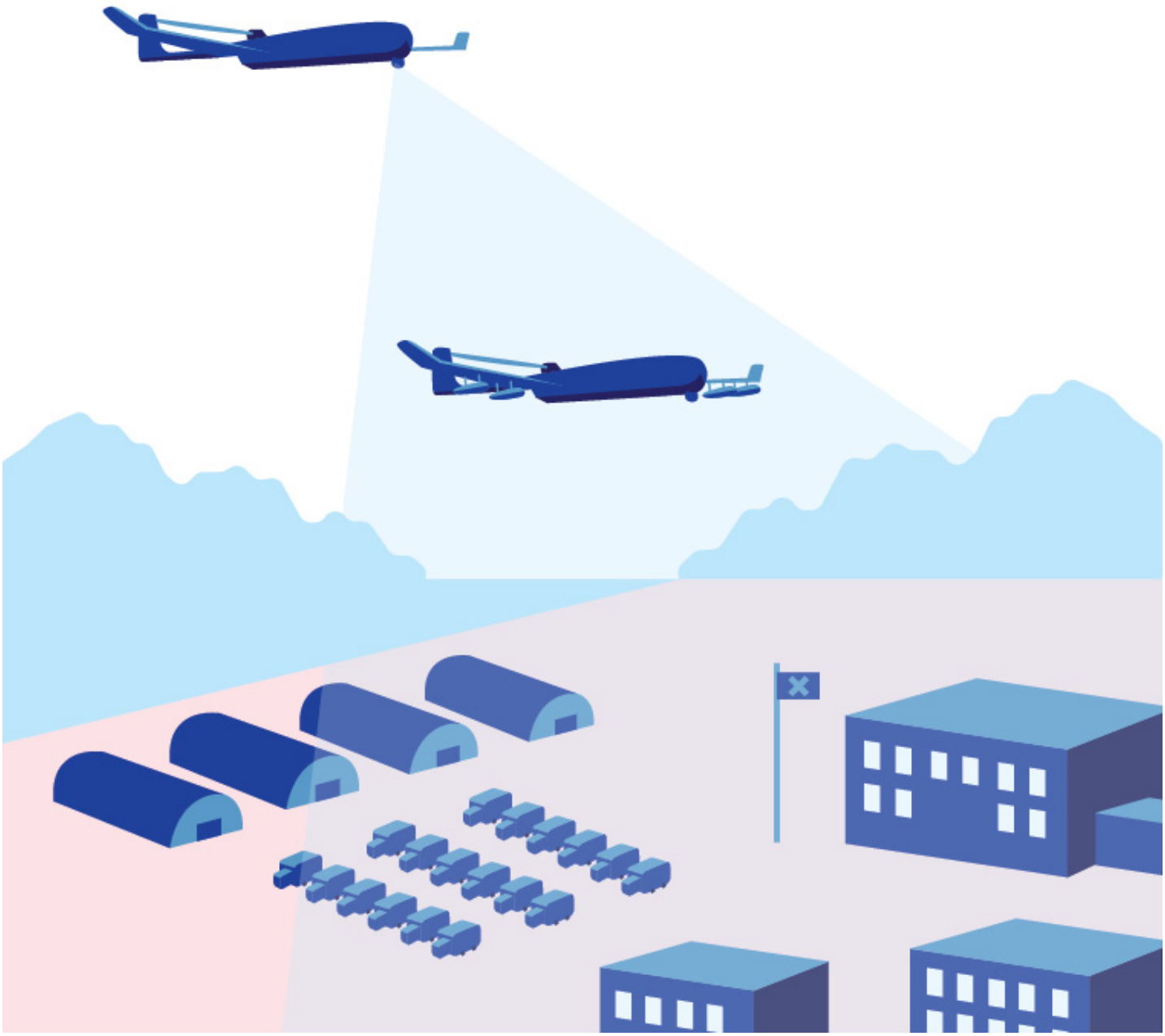
- Drones were flown over the sovereign territory of adversaries. Overflight was primarily intended to be deniable and objectives included persistent surveillance and the collection of targeting intelligence.
    - If states had only the option to use traditional aircraft in similar scenarios, they might not have taken action due to the risk to pilots and the strategic risk posed by rapid escalation, whereas drones were both expendable and deniable.
- Drones were used as a low-cost way of intervening or engaging in low-end or gray zone conflicts. State actors used drones to conduct surveillance, collect video footage for propaganda, carry out deniable attacks, and to assist friendly forces.
    - Drones allowed one of the major power teams in the wargame to engage in a gray zone conflict for which there was little political will. The team had large, military-specific drones in addition to small commercial drones. These assets allowed the state actor to provide deniable low-risk support to friendly forces at no domestic political cost.
- Armed drones engaged in persistent surveillance missions were used to reduce the steps between identifying and eliminating a target, carrying out strikes as soon as a target was identified and confirmed.
    - Access to armed drones allowed state actors to strike almost instantaneously upon receiving actionable intelligence and at a much lower cost than conducting traditional airstrikes.

Drones expanded information opportunities for all actors. The ability to conduct persistent, low-cost intelligence, surveillance, and reconnaissance (ISR) is a well-recognized and core

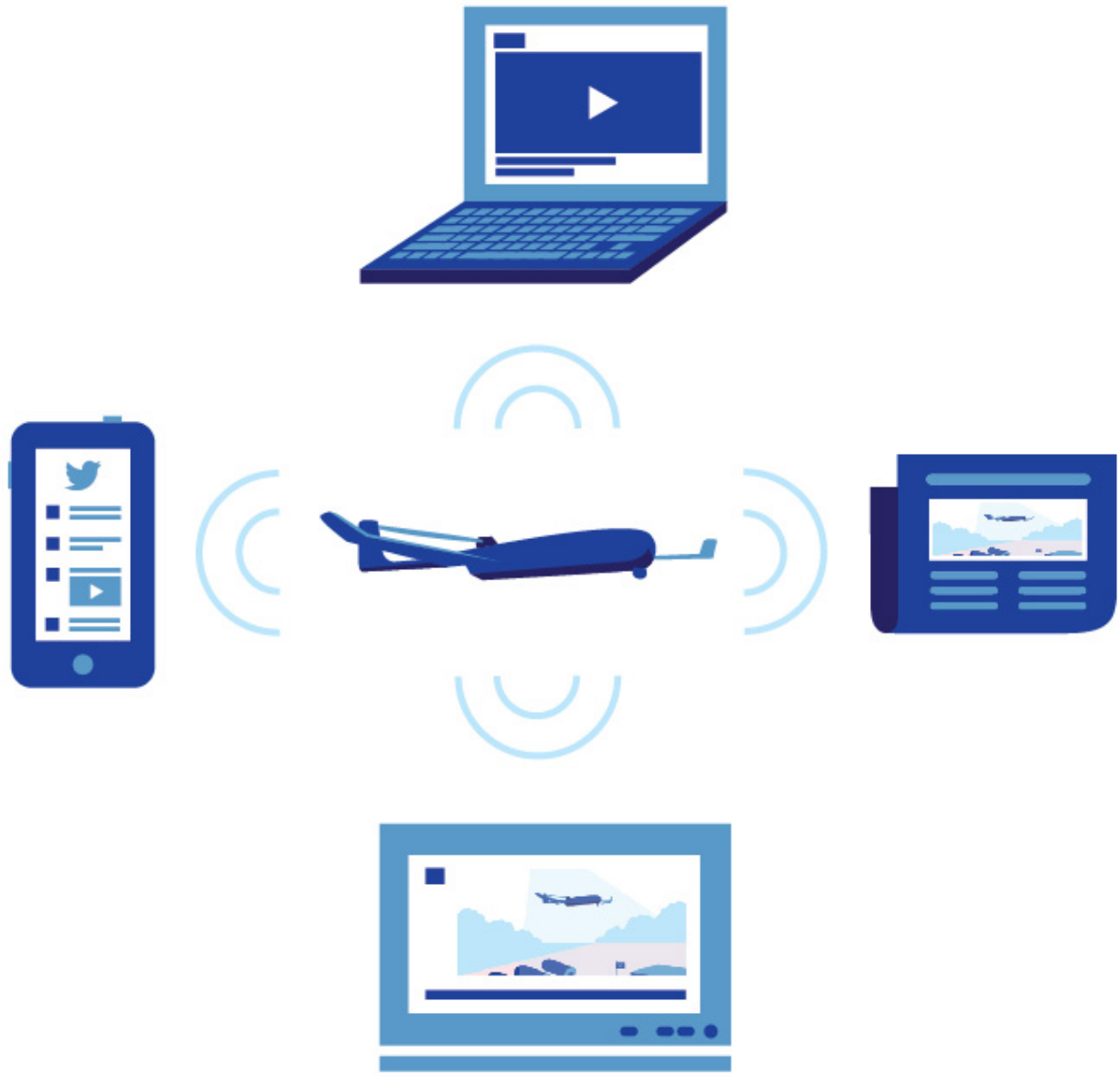
advantage of uninhabited systems. In addition to the direct military benefits drones provided, drone surveillance was also used for political effects: to publicly increase transparency, shape public opinion through propaganda, or sow misinformation. Many of the most interesting use cases came from non-state actors, who used information (or misinformation) as a tool to counter or blunt the advantages of stronger opponents.

Show of Strength

The non-state actor team outfits a drone with fake missiles such that it appears to be armed.



The 'armed' drone is filmed by a second surveillance drone while flying over an adversary's military base.



Video footage of the drone overflight is disseminated publicly in order to generate a deterrent effect within the context of an ongoing conflict.

Operational concepts taking advantage of information opportunities gained by drones included:

- Non-state actors used small and midsize commercial drones to film propaganda videos demonstrating their military capabilities, including armed drone overflight and

improvised attacks carried out by small drones.
    - In one particular scenario in which the non-state actor was weakened and unable to launch further strikes against their adversary, they turned to drones' information capabilities to bolster their position. The non-state actor rigged an unarmed drone such that it appeared to be armed and partnered it with a second uninhabited system to film its overflight of their adversary's military base. Transmission of this footage to their adversary helped the non-state actor build a small deterrent capability and defer continued conflict to rebuild their forces.
    - Use of such video granted non-state actors the ability to wield greater control over their public image and undermine their adversaries' narrative.
- Non-state actors employed midsize military and commercial drones to draw fire and collect targeting intelligence on the location of their adversaries' defenses.
    - Improved and timely intelligence collection using drones provided non-state actors with a method of replicating traditional precision-strike capabilities.
- State actors used midsize and large military-specific drones to collect and publicize video evidence of adversaries' activities that flouted international law or other norms of behavior.
    - In one case, the state actors team used drone video feeds to increase transparency about their adversary's behavior.

Responding to and countering the use of drones. As states and non-state actors evaluated when and how to employ drones, they also considered how to respond to and counter others' use of them. The breadth of use cases demanded that participants consider a variety of options for responding to and countering drones. Actors chose to ignore, escort, or shoot down drones – traditional response options for human-inhabited aircraft – or they chose to employ tools of electronic warfare, such as jamming, or exploited drones' cyber vulnerabilities. Notably, the non-state actor team had the most limited resources available to respond to or counter drone use and most often had to change their behavior in order to avoid persistent surveillance or strikes from drones.

Tactics employed in response to the use of drones included:

- State actors did not hesitate to shoot down and destroy their adversaries' drones if they were discovered within their territory or posed an obvious threat.
    - This action sent a clear message to adversaries using drones and risked little in the way of backlash.

- State actors also attempted to intercept and escort drones out of sovereign territory.
    - These efforts proved less successful due to uncertainty about how to communicate with the operator of the drone.
- To counter or prevent the use of drones within specific areas, state and non-state actors often used jamming and other electronic warfare tactics.

Drones' limitations. Where these archetypal use cases shed light on the overall utility of drones and the operational concepts that best take advantage of the capabilities of uninhabited aircraft, they also illuminated the limitations of drones. Although every team chose to employ drones in each of the 12 scenarios, they did not necessarily function as the core asset or enabler, nor were they used in every move within a scenario. In some cases, participants expressed that their team's use of drones made little to no difference to the final outcome of the scenario. For example, one team noted their preferred asset was a human-inhabited long-range maritime patrol aircraft because countering this aircraft more clearly identified their adversary as an aggressor in a maritime dispute.

Reasons why actors chose either to not use drones or limit their operational role compared to traditional military capabilities included the following:

- Drone use signaled hesitancy or a lack of resolve. Although a team might have been able to achieve their operational goal using drones, the implicit messaging associated with uninhabited aircraft prevented them from achieving their political or strategic goal.
- Drones were more vulnerable to countermeasures like jamming. This vulnerability made drones a less reliable tool for essential operations.
- Drone capabilities were insufficient to achieve the operational goal. Because the technology of uninhabited aircraft is still relatively new, it did not match the capabilities of traditional human-inhabited aircraft, particularly speed and maneuverability.

Overall, the scenarios in which drones played a secondary or limited role demanded more decisive action, making the use of traditional military capabilities more appropriate. Comparatively, the scenarios in which drones played a stronger role were the more ambiguous conflicts that demanded flexible assets in terms of messaging and capabilities.

Analysis of Findings

A central finding of the wargame is that despite drones' relatively common capabilities, their

expanded use will have significant political and strategic implications. The core difference between drones and traditional aircraft may be a simple one – the absence of a human on board – but it has a profound impact on the way actors choose to behave and interpret the actions of others in crisis and conflict scenarios. Drones' uninhabited nature provides a wider set of options for military action to more actors across the spectrum of conflict.

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Increased optionality grants states and non-state groups greater flexibility in terms of when and how they choose to engage in conflict, particularly in those interactions that fall short of full-scale war. The uses of drones observed during gameplay highlighted those capabilities unique to uninhabited aircraft that influence operational concepts and reshape strategic decisionmaking in conflict.

First, actors can use drones without risking the life of a pilot. This opens up more potential uses for drones. Actors are more likely to employ them in situations where they are at greater risk of being shot down, which might include situations where previously they would not have taken any action. Actors might even try to provoke others to shoot down their drones to paint their adversary as an aggressor.

Second, drones can replicate the capabilities of traditional, human-inhabited aircraft at a lower cost. This lowers barriers to entry for actors that previously had limited access to airpower and associated power projection and ISR capabilities. Additionally, drones provide states a cheaper, or even expendable, alternative to traditional aircraft that can lower the cost of asserting airpower and expand possible use cases.

Third, drone ownership and use can be deniable. Due to the widespread commercial availability of drones, the use of a commercial off-the-shelf system could conceivably be from anyone,

complicating attribution. Furthermore, even if drone ownership is perfectly clear, the actions of a drone can be disavowed. Because there is no pilot onboard, an actor can claim they lost communication with the drone and had no control over the drone at the time of its actions.[9]

Fourth, because drones are new, actors can define the message of drone use and respond to others' uses at their own discretion. This flexibility comes from the lack of any internationally accepted normative framework for using or responding to the use of drones. There is no specific intent associated with the use of uninhabited aircraft, nor is there necessarily strong political or public pressure to respond to the shoot-down of a drone because no lives would be lost.

What do these options mean on the battlefield, and what are the larger political and strategic consequences?

The proliferation of drones expands access to airpower, providing higher marginal benefits to weaker actors. Wider access to drones expands the realm of the possible, particularly for weak states or non-state groups. Compared to more established powers, weaker actors experience higher marginal utility from access to drones. Because their military capabilities, specifically airpower, tend to be limited, acquiring drones represents a more significant gain in military capacity.

This gain empowers weaker actors to engage in a new domain, enhancing their abilities to project power and improving their capacity to contest airspace, resulting in a shift in traditional power dynamics. As drones proliferate, it is unlikely established powers will be able to count on uncontested air dominance, especially in irregular warfare settings.[10]

The use of drones complicates messaging and escalation dynamics. New options for engagement in conflict afforded by drones can complicate the understanding of messaging and traditional escalation dynamics in conflicts. This lack of clarity in action can be because drones allow deniable action, put a new rung on the escalation ladder, or because actors have greater flexibility in how to respond and interpret the use of drones.

Drones offer actors a more gradual escalatory action compared to the use of other military assets; uninhabited aircraft do not demonstrate the same resolve that a fighter aircraft might. Therefore, with drones, actors have the ability to take military action in contentious scenarios with less risk of provoking a significant response. Yet, in expanding the space for action on the spectrum of conflict below full-scale war, drones create increased opportunities for misunderstanding and miscalculation and can even encourage riskier political or strategic choices.

Increased ISR will heighten competition for information dominance within the battlespace and will create more opportunities for the use of information and misinformation.

Widening access to drones creates more opportunities for the use of information and misinformation. As access to drones expands, not only will more actors be able to build up their airpower, but they will be able to implement more robust real-time ISR capabilities. Increased ISR will heighten competition for information dominance within the battlespace and will create more opportunities for the use of information and misinformation.

More actors will have the ability to release photographs or video footage gathered by drones to shape the public narrative surrounding a conflict to their advantage. In conflicts where there are competing interests, these increased information opportunities heighten the risk of misinterpretation and miscalculation instead of improving transparency.

Generally speaking, drones' optionality fundamentally augments the types of military operations actors can choose to undertake in conflict settings. These new choices allow for increased flexibility and room to engage adversaries, especially in uncertain environments. More importantly, this resulting shift in strategic decisionmaking changes the political implications of military force.

Implications

As evidenced by the behaviors observed in the wargame, the proliferation of drones will continue to influence and shape new behaviors and distribute power in ways that demand greater attention. While U.S. drone use currently looms large as a precedent for how one major power has used drones, it would be naïve to assume that all actors will emulate the way the United States uses drones. The demands of different conflicts and crises will generate different, perhaps unpredictable, uses of drones. The way in which actors use them – and respond to their use – has several implications for future conflicts and crises.

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Battlespace monitoring will rise. Policymakers need to consider the impact of the potential constant, real-time exposure of the battlefield and explore the effects it will have on strategy and the success of military operations.[11] Nonstop drone surveillance could be a natural escalation of the "CNN effect," in which the 24-hour news cycle affects how states conduct foreign policy. With a potentially overwhelming amount of information widely available as a result of increased drone surveillance, there is increased potential for the spread of misinformation, a lack of context surrounding actions, and political pressure for immediate political or diplomatic responses.

In spite of the increased amount of information available to actors, ambiguity about the meaning and intent behind actors' actions will increase. As the global demand for drones rises, commercial and state production and sales of a wider variety of drones will also increase. In a short amount of time, it will become more difficult to identify the owner of a drone and attribute responsibility for actions undertaken by drone operators. Expanding use of uninhabited aircraft in an uncertain policy environment and increasingly complicated attribution will only increase opportunities for misinterpretation and miscalculation of the intent behind drone usage. With various actors crafting individualized strategies and policies for using and responding to the challenges of proliferated drones, there is a heightened risk of conflict escalation.

The maturing development of counter-drone capabilities will increase the stakes of drone employment and the frequency of response. While counter-drone capabilities and strategies will likely emulate those of traditional airpower, following constructs of airborne interception or

targeted strike from surface assets, other capabilities will be developed, making drone employment even more unpredictable. Over time, counter-drone options are likely to grow further as drones proliferate and counter-drone technology advances. Nonlethal means of disabling drones, counter-drone lasers, and cyber hijacking tactics are already being explored and in some cases have been demonstrated.[12] It is imperative that policymakers think through these potential consequences while they are still in a theoretical stage in order to consider appropriate responses before a crisis occurs.

Recommendations

When we look out at the horizon of a world of proliferated drones, it is necessary to consider the steps the international community and the United States can take to adapt successfully. Following are key considerations policymakers should weigh carefully.

UNITED STATES

Understand that the United States is unlikely to remain the dominant user of drones and recognize the patterns of global proliferation.

Consider how U.S. operational concepts are setting a precedent for other actors' employment of drones.

Explain more clearly internationally how the United States employs drones and U.S. expectations for appropriate drone use.

Consider targeted, conditional drone exports to key allies and partners to improve their capabilities and help shape their norms and expectations for drone use.

INTERNATIONAL COMMUNITY

Anticipate the varied ways in which state and non-state actors will use and respond to drones.

Consider how the escalation picture will develop in different crisis and conflict situations.

Understand that norms surrounding drones will develop over time and act accordingly, rather than attempting to create generic normative policy.

Understanding the implications of drone proliferation and analyzing both external and internal attitudes toward drone usage will facilitate the development of strategy and policy that better equips us to handle the contours of a drone-saturated world. Presently, drones are used entirely based on the isolated judgments of expediency by each state or non-state operator. Precedents are being set haphazardly through decisionmaking motivated by crises.

Furthermore, as advances in robotics and autonomy continue, uninhabited ground and maritime systems will mature and are sure to mirror the proliferation of drones. Looking ahead, their proliferation and use in land and sea domains is likely to have an impact at least as significant as drones are having on traditional airpower. Identifying and setting effective precedents to cope with the challenges of drone proliferation early on will help limit the disruption further proliferation of uninhabited systems will have within other domains of warfare.

Acting now grants the United States and its allies the greatest opportunity to shape policies and emerging norms surrounding uninhabited systems to their advantage and adapt strategically to a new landscape.

About the Author

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Endnotes

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Image Credits

Naval UAV Air Demo, 2005, pictured are (front to back, left to right) RQ-11A Raven, Evolution, Dragon Eye, NASA FLIC, Arcturus T-15, Skylark, Tern, RQ-2B Pioneer and Neptune: U.S. Navy photo by Photographer's Mate 2nd Class Daniel J. McLain via commons.wikimedia.org

An MQ-9 Reaper performs aerial maneuvers over Creech Air Force Base, 2015: U.S. Air Force photo by Senior Airman Cory D. Payne via dvidshub.net

An AN/TWQ-1 Avenger with the 1st Batallion 204th Air Defense Artillery Regiment of the Mississippi Army National Guard destroys a drone during a live fire exercise at Fort Bliss, Texas, Oct. 7, 2015: Mississippi National Guard Photo by Staff Sgt. Scott Tynes, 102nd Public Affairs Detachment via dvidshub.net

MQ-1 Predator controls, Capt. Richard Koll, left, and Airman 1st Class Mike Eulo perform function checks after launching an MQ-1 Predator unmanned aerial vehicle August 7, 2007, at Balad Air Base, Iraq: U.S. Air Force photo by Master Sergeant Steve Horton vis dvidshub.net

The Pentagon, 2016: U.S. Army photo by Sgt. 1st Class Marisol Walker via dvidshub.net