

## China's Conceptualization Work on UAVs: Toward an Unmanned Battlefield

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OE Watch Commentary

As military theorists in China's Peoples' Liberation Army (PLA) analyze the impact of intelligent technologies on future warfare, a recent article in the *People's Liberation Army Daily*, the PLA's daily news journal, discusses concepts for employing UAV groups based on the progression from mechanized warfare capabilities to informationized and intelligent technological capabilities. This represents a technological progression from "UAV fleet operations" to informationized "UAV group operations" and finally to "UAV swarm operations" using intelligent technologies to achieve a degree of autonomy. This last stage leads the theorists to visualize what they described as an "unmanned battlefield."

The authors describe the concept of UAV fleet operations as rooted in mechanized warfare, placing this stage of UAV group employment within the current capabilities of the PLA. UAV fleet operations are described as a collection of three or more UAVs operating under a unified command and implementing the same combat action to achieve a common goal. UAV fleet operations reflect mechanized warfare capabilities in that their combat effectiveness is generated by quantity and scale enhancing firepower support and killing efficiency. The advantages include that this type of operation is conducive to centralized management and high efficiency for simple tasks; disadvantages include low efficiency for task coordination, weak distributed task capabilities, weak group scalability, and weak adaptability. The primary missions are firepower focused.

UAV group operations represent informationized warfare capabilities. Currently, the PLA is in the process of modernization based on information technologies with these capabilities growing within the force. UAV groups are interconnected by onboard computers and communications network. UAV groups operate under a unified command, which jointly manages the execution of a common task. The UAV group acts as a unified whole cooperating in a combat activity. UAV group operations generate combat power based on information empowerment, networking, and coordination of actions within the group. Advantages include high efficiency for task coordination, strong operational flexibility, the capability to perform distributed combat tasks, and group scalability; disadvantages include a high requirement for information technologies, complex UAV design, and vulnerability to electronic interference.

UAV swarm operations are described as a biological simulation of a bee colony enabled by intelligent technologies. A UAV swarm is defined as a group of autonomous, networked UAVs working to achieve a unified operational objective. The UAV swarm is based on groups of intelligent drones working in collaboration. The individual drones might have low intelligence, but through interactive and reactive rules they emerge as a complex group with self-organizational capabilities. Characteristics include decentralization, flexibility, and group intelligence working towards a common objective. The authors believe that UAV swarm operations subvert traditional warfare concepts through their autonomous combat capabilities of self-adaptation, self-organizing networks, self-coordination, and

self-decision making. Advantages include high efficiency for task coordination, strong operational flexibility and battlefield adaptability, strong capability to conduct distributed tasks, and group scalability. Disadvantages include a requirement for large numbers of advanced drones and high research requirements in biological simulation technology. While many of these UAV concepts are generally well-known, this current PLA research on intelligent technologies and operational concepts will assist in the eventual deployment of these capabilities within the military, and as the authors envision, toward an unmanned battlefield.

**Source:** “群式作战，演绎无人战场新图景” (Group type operations, deducing a new vision of the unmanned battlefield), *People's Liberation Army Daily* (PLA's daily news journal), May 20, 2021. [http://www.81.cn/jfjbmap/content/2021-05/20/content\\_289733.htm](http://www.81.cn/jfjbmap/content/2021-05/20/content_289733.htm)

*At present, UAV group type operations has entered the battlefield practice from the concept research, which indicates that the development of UAV new operation mode is becoming more and more mature. UAV group operations usually include UAV fleet operations, UAV group operations and UAV "swarm" operations. Because there is no authoritative concept description of the three systems at home or abroad, it is easy to cause conceptual confusion, which is not conducive to the in-depth study of UAV group operations. Therefore, it is necessary to analyze the three concepts in order to clarify the understanding, so as to deepen the understanding of the characteristics and laws of UAV operations.*

*UAV group type operation is a new and practical operation mode, which has great operation potential and application prospect, especially for UAV "swarm" operations, which may subvert the traditional operation mode, and should receive great attention. A correct understanding of UAV fleet operations, UAV group operations and UAV "swarm" operations is an important foundation and prerequisite for accelerating the development of mechanized, information-based and intelligent integration of UAV group operations. In actual combat, we should not only pay attention to the application research of UAV fleet operation and UAV group operation, but also carry out the research of UAV "swarm" technology and operational applications in advance. Only through preparation can we grasp the initiative.*

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