Demand Analysis Based on SWOT 's Intelligent Unmanned Aerial Vehicle Swarm

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Abstract. With the gradual maturity and development of intelligent technology, its application has covered all aspects of various fields. In modern war, intelligent and swarm combination has emerged more advanced integrity. Therefore, the application and development of Intelligent UAV swarm (unmanned aerial vehicle swarm, UAV swarm) have become one of the hot researches. The UAV swarm have been coordinated with each other, and more advanced group intelligence characteristics have emerged, showing more advanced self-healing and robust and intelligent. intelligent systems that are integrated, systematic autonomous, information sharing and autonomous decision-making through different loads. Although the UAV swarm has many advantages, how to apply the UAV swarm to the most suitable field, and the relevant demand demonstration research is still less. SWOT is a classic method of strategic target analysis, which has the characteristics of structured, systematic, and clearing. Analysis of UAV swarm through SWOT, further clarifying the need for its development and the challenges currently needed.

Keywords: UAV Swarm, Intelligent Swarm, SWOT Analysis, Demand Analysis

1. Introduction
Swarm refers to a Group consisting of Self-Organizing that is acquired or attempts to obtain the coordination behavior [1]. Biological swarm. By observing individual behaviors and rules such as hoods, geese, ant colonies, and wolves, etc., which are found to have complex group intelligent behavior through interpretation and collaboration, with more advanced complex capabilities. From the swarm intelligence, it is derived from the concept of smart operations, also known as "bee colony" operation, relying on advanced technical support and quantitation, forming a complex organic overall, and obtaining the initiative.

2. UAV Swarm
In the modern war, the key to winning is the mastery of the air control. UAV swarm has absolute advantage in space, time, and cost, it is increasingly prominent in combat applications. Single UAV is constrained by its own conditions, there is a certain limitation in the face of complex operational tasks. The more effective combat mode of the UAV swarm operation is life, is one of the effective combat methods for combat effectiveness. UAV swarm is a certain number of homologous or heterogeneous drones, utilizing information interaction and feedback, excitation, and response, achieving inter alias synergies, adapting to dynamic environments, and co-completing self-essential air intelligence systems for specific tasks [2]. Not a simple quantity superposition, but through the technical control of the information sharing of multiple unmanned systems, task planning and intelligent collaboration, completing the task in complex and varied combat environments, to achieve its superior quantity, low cost, strong adaptability, fast application value.

3. SWOT Method
In the current strategic planning report, SWOT analysis is a well-known tool. SWOT analysis from McKinsey Consulting, including analysis of companies’ Strengths, Weakness, Opportunity, threat [3]. Analyze the inherent advantages and disadvantages internally through scientific, reasonable ways, master external opportunities and threats. Evaluate the project is simple and efficient, providing decisions for relevant arguments. The SWOT method combines qualitative analysis and quantitative analysis, and provides a basis for the development strategy for combined analysis of four major elements and seized opportunities, resolves threats, and overcoming the ideological logic of disadvantages. It is of great significance to strategically analyze it to the weapon equipment development strategic environment. Core issues that need to be resolved are obtained by specific analysis and comparison of environmental, threats, capabilities, status and demand conception. Such as Figure 1.

4. Decision Support Analysis of UAV Swarm Based on SWOT
Developing SWOT into the demand analysis of UAV swarm, and analyzes its development strategy by taking advantage of its Strengths, Weakness, Opportunity, Threat, Make precise decisions, improve the overall application efficiency of UAV swarm.

4.1 Strength( to Ensure That in the Future Situation, It Is Necessary to Effectively Utilize the Resources Advantage.)
(1)Emerging intelligent power, UAV swarm combat is different from traditional operational model, is a new swarm combat system, through UAV swarm such as different functions, etc., equipped with various types of loads, break through air defense System, quickly launch a combat task, implement intelligence reconnaissance, command control, combat assessment, support, electronic confrontation, etc., the
emergence of echogenicity is an unlimited, and the promotion of self-control and autonomous learning, its group intelligence. The degree will evolve evolution, which is of great significance to accelerate the formation of combat power.

(2) The combat style is flexible and diverse, and the combat wars will change. Sphering quickly and highly scattered in combat mode, fast conversion of aggregate attacks, in combat power, strong mobility, strong multidimensional liquidity, its unique autonomy, can respond faster to the battlefield environment, improve overall strategic value.

(3) Strong survival, complementary advantages. Take advantage of the economic, quantity, consumption, etc., complementary combination of combine combat advantages. Because the swarm has strong robustness, even if the individual suffers from attack failure, the swarm can also be quickly complemented by each other, strong self-healing, and the combat power is not affected, and the task can continue.

(4) Strong sense of perceived ability, highly dispersed form forms a distributed perception, a more comprehensive sense of on-site situation, more accurate combat assessment, more accurately confirming the operational goals.

4.2 Weaknesses (Actively Change the Resource in Terms of Disadvantage Avoidance)

(1) The UAV swarm has a complex structural system. The system complicated uncertainty is unpredictable. The development of intelligent autonomous technology is also full of unknown, and the corresponding combat efficiency assessment is difficult, non-structured data awareness, strong environmental confrontation. The complexity of sexual and task has brought uncertainty to the construct of collaborative operation system.

(2) UAV swarm communication network structure is complicated, is a three-dimensional all-round structure, which is the foundation element of the unmanned swarm. Although the existing technology solves the problem of loss and delay in a certain extent, it is more complicated. The battlefield environment will still be affected by the environment of the atmosphere, altitude, temperature, etc., information sharing, intelligent interaction capability needs to improve.

(3) The technical gap is large, and the domestic unmanned chart has started late. The relevant studies are not mature enough, and independent control cannot be truly controlled. How to better plan tasks, avoid barriers, complete collaboration, maximize benefits, ensure equalization, and constantly optimize autonomous control capabilities, break through key technologies, improve independent learning ability, and break the technology, there is still a long way to go.

4.3 Opportunity (Using the Development Trend Opportunities, You Can Have a Favourable Situation in Future Confrontation)

(1) In recent decades, with the continuous breakthrough of unmanned key technology, the development of drone is constantly mature, and has been widely used in major areas, and well-known professors in the United UAV swarm Kumar in August 2016 in CCF. -Gair summit proposes 5S theory of UAV future development (Figure 2), namely Small, Smart, Speed, Safe, and Swarm. And clarify the importance of swarm intelligence. Swarm Intelligence will emerge more salient advanced features. With the continuous research of drone technology, the unmanned gathering is a good environmental development in the development of unmanned opportunities due to its excellent coordination, intelligence and autonomy, and has a broader application [4].

(2) Technical integration, excellent technical support and artificial intelligence of domestic and foreign countries, optimized a lot of complex swarm tasks, such as foreign Cook et al. The difference between the calculation of the algorithm [5], Langle et al. Proposing the Kamara distributed architecture model to correct the error [6]; domestic Zhou et al. Proposes the geese bismuth to increase the stability of the flying
formation of the unmanned group [7], Jingxian Year Establish a swarming motion model and motion control model to solve the vaccination of drone, aggregation issues [8], Rodlin, etc., establish the anti-machine single-machine behavior set to improve the confrontation of the drone swarm [9]. The development of UAV swarm will become more intelligent, and the breakthrough of single technology is constantly improving its performance [10].

(3) Strong economic, its superior sustainability and low cost, making its swarm role play an important application value, leading to the new intelligent swarm operation mode, according to its economic advantage, can make a large small and medium-sized distributed platform, Form an open, heterogeneous and distributed multi-platform UAV, achieve system function multiplication through economic advantages.

4.4 Threats (The Challenge of Unfavourable Development Trend has Led to a Situation in Which Losses)

With the strong application of artificial intelligence technology represented by independent control, machine learning, the operation of unmanned combine combat is getting bigger and bigger. It is necessary to recognize the gap between my country and foreign development. The violent development trend of foreign unmanned competitions has caused great challenges and threats to our email, how to grow, reduce the gap, optimize the design, strengthen intelligent synergy, and form a multi-domain confrontation Means, multi-platform joints should respond to strong enemy, early layout, passive, passively, active is the fact that the current needs to be solved. Such as Figure 3.

5. The Next Step in the Unmanned Swarm

Comprehensive four key elements indicators S, W, O, T, cross-analysis, forming OS, OW, TS, and TW strategic analysis, generate corresponding SWOT countermeasures, provide the development direction and key points of intelligent UAV swarm development for the next step decision making.

5.1 TS Strategic Analysis

Although my country will start in the future, it may be suppressed by other military strong national humiliations in future operations, but as the state has vigorously put human material financial resources, it is also constantly shortening the gap. Pay attention to foreign drone development concepts, such as the direction of the US military swarm more focused on scale, and suppressed the other party, improving
survival capacity and system performance. However, due to the large quantity, combat capabilities cannot be formed quickly, and to ensure the reliability of the swarm share is more stricter. We have developed a different path when developing a swarm integrated strategy, tradition and innovation concepts, and focusing on the mixing of heterogeneous synthesis, module classification multi-product load, closely planning synergistic control direction, and build a smart platform on-demand configuration. Steady and stabilization gradually exerts its superior overall performance to occupy the opportunity. Such as Figure 4.

5.2 OW Strategic Analysis
When facing complex and varied task scenes, there has been greater challenges and requirements for the motoric performance, response speed, load capacity of the UAV swarm, one but on-site conditions, drone It is also a challenge if the mission plan is adapted. It is also a challenge. Must under ensuring economic advantages, large-scale improvement of communication links, collaborative strategies, autonomous control, model optimization, etc., which have more intelligent, more advanced, and applicable. Such as Figure 5.

5.3 OS Policy Analysis
To seize the development of existing advantages and opportunities, form a positive swarm effect should actively promote intelligent synergy. If the bionic intelligence, the unmanned gathering group is intelligently learning to the wolves, geese, the ant columns, etc., so that it has its own ability to organize, self-healing. Develop more intelligent autonomous decision-making technology, making it self-learning ability, continuously upgrading optimization, producing more powerful ability. Such as Figure 6.

5.4 TW Policy Analysis
The negative impact of the security threat of the prior art in the existing technology cannot be ignored, defined and utilized to use the aerial intelligence power is the top priority of the problem, and through the full consideration of various factors The influence of group intelligence can break the deadlock through some strategic measures. Under the current immature conditions, there can be combined with the development of people / drones in the development of Manned/Unmanned Aerial Vehicle, focus on system confrontation, combat styles, and form a more interactive joint system, multivariate combat styles can also Cancel your strength to achieve combat capability leapfrogging. Such as Figure 7.
By using SWOT four core elements of the UAV swarm, development strategies have been developed according to relevant trends, and have certain reference significance for the next development direction.

6. Conclusion
This paper analyzes the intelligent UAV swarm, and analyzes the development of UAV swarm through the SWOT analysis method. The development of UAV swarm and its application. The trend of artificial
intelligence is unstoppable. With the continuous development of emerging technology, the unmanned business swarm will become one of the strong power in the air.

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