

Analysis on the Impact of Intelligence Collection and Processing Technology on Operational Effectiveness

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Abstract: The intelligence collection and processing technologies have been applied in combat. Some new features of intelligence processing have emerged such as omnipotence input methods, intellectualization of processing methods and diversity of distribution methods. The intelligence collection and processing technologies have great influence on command efficiency in information leading modern warfare for example the reaction speed of weapons, intelligence information timeliness and enhancing operational command efficiency. In order to improve command efficiency, we proposed several ideas. First, the reconnaissance and communication equipments should be developed, especially advanced reconnaissance and early warning satellite, advanced warning and reconnaissance radar that can detect stealth aircraft, and digital communication equipments with communication satellite as the main part. The second is to improve the overall efficiency of the existing reconnaissance equipment and communication equipment. Third, expand channels of intelligence and communications security.

Keywords Intelligence; Collection; Processing technologies; Effectiveness

INTRODUCTION

Increase in the content of intelligence collection and means of acquisition

1) Expanding continuously the contents of command information with the development of science and technology

The variety of intelligence information depends on the size of battlefield, the rhythm of combat, the types of arms and services involved and the types of weapons used. There is no doubt that, the greater amount of intelligence produced as the combat space is wider; with the faster tempo of operations, the more intelligences per unit time are needed. The larger number weapons are used, the content of intelligence information produced is complex and varied. The progress of science and technology directly and indirectly affects the scope of the battlefield, operational tempo, weapon equipment type, service type and arms type, so the information content has been in the process of constantly expanding.

2) Increase in the means of command intelligence acquisition with technological development

In terms of the means of obtaining information, the development of science and technology has led it to go through a road from personnel reconnaissance to equipment reconnaissance, from direct observation to remote sensing reconnaissance, from audio-visual reconnaissance to electromagnetic acousto-optic technical reconnaissance, and from ground reconnaissance to multi-directional reconnaissance. The development of electromagnetic wave technology has led to the emergence of radar, enabling the reconnaissance personnel to observe, locate and track the targets in the air, on the ground and at sea that are

not visible to the naked eye when the enemy is attacking the aircraft dozens of kilometers away. Advances in acoustic technology have led to the emergence of sonar, which allows naval soldiers to easily detect and track underwater targets such as enemy submarines and torpedoes. With the advent of synthetic aperture radar and multi-spectral remote sensing technology, it can not only detect the activities of the enemy in cloudy and rainy days, but also penetrate the sea and the surface to see the locations of underground pipelines and command posts within the range of shallow sea. The emergence of laser night vision technology enables people to observe the activity of enemy tanks and personnel under dark conditions with the help of laser amplification technology and infrared thermal imaging technology. Modern global positioning system can accurately provide the navigation and positioning data for the fighters. Aviation technology realizes aerial reconnaissance, while the development of space technology realizes global satellite reconnaissance.

Improvements in the way of handling information

Command information can be easily and effectively used by command personnel only through proper processing, which is a very important task of intelligence activities, including information classification, collation, comparison, screening, analysis, research reports, reporting, storage and retrieval. Scientific development provides scientific methods and means for information processing.

1) Universal input method

In the information battlefield, the information sources of the information processing system requiring input information are extensive and the

carriers are diverse, which inevitably requires the system input function to be strong. The so-called omnipotent input is the input way that the information from different channels and different carriers is transmitted to the information command system. The omnipotent input ways to intelligence information system include manual and automatic mode; The omnipotent input ways mean that the information from various channels is inputted to intelligence information system which are computer network, radar network, GPS network, command communication network and sensor information network. The various forms (carrier) of information that are text, picture, sound, image, data and signal can be input the omnipotent input system. To realize omnipotence of input, on the one hand, it is necessary to solve the problem of interface with various information channels. Through various external input devices, computers in the information processing center are directly connected to various channels. On the other hand, it is also more important to study and solve the format conversion problem of different information that is to be changed into a format that can be processed uniformly by the computer.

2) Intelligent processing mode

The inner requirement of intelligence information processing automation system is intelligent processing mode which a large amount of intelligence information can be processed quickly and well, and real-time information can be provided to commanders to meet the operational needs. To realize intelligent processing, first of all, a lot of complex information input should be quickly classified and sorted, then be stored in various databases for query use. With the development of optical recording technology, the information storage can be reduced. For example, the U.S. army's used a CD to contained thousands of maps and nearly all of the U.S. military's weaponry data in the Gulf War. The second to be retrieved automatically by computer technology which the required information can be found and printed out in a one minute or two minutes. The information can be retrieved through computer networks to realize sharing of information. the difficulties would be solved that the military intelligence files to be found will consume a lot of time with manual method from voluminous to paper in the past. Then ,a systematic screening process is established to enable vital or urgent intelligence information to be provided to commanders as quickly and concisely as possible; At the same time, commanders can also get the relevant and reliable intelligence information related to the combat missions of the headquarters (sub-units) through screening process. Last , the intelligence processing expert system and data fusion technology are applied to integrate the scattered information, forming a comprehensive and accurate understanding of the battlefield situation, as well as a judgment of the enemy's intentions and threats.

3.) Diversified distribution methods

The types, contents and times required by each intelligence needs unit on the battlefield are different, which lead to the intelligence distribution methods diversified. In other words, various forms and means should be adopted for the distribution of the processed intelligence information. For example, information shared on the battlefield can be broadcast in real time to make all units in the battlefield can share information at the same time. The intelligence information required by each unit can be booked in advance by each user according to the intelligence information required in the future. At that time, the system will distribute automatically according to the user's requests. Some intelligence information is classified, usually distributed at the command level, so there is an on-demand way for the superior commander to forward the information to his subordinates as needed. All in all, the distribution should be flexible and diversified, and the ultimate goal is to achieve the intelligence needs units can get the information they need at the time and places they need, in the form they can most easily use.

INFLUENCE OF INTELLIGENCE COLLECTION AND PROCESSING ON COMMAND EFFECTIVENESS

In the information-based battlefield, time in the increment is an indisputable fact. If the past wars were measured by day and night or by hour, it would be measured in seconds now. when both warring parties are In the fierce competition in a certain period of time and space, they will try their best to complete the combat operations in the shortest time to gain the advantage of opportunities and to seize the initiative in the battlefield. If you lose a few minutes, it means that you lose an army or even a victory. In that case, the time left for intelligence processing must be shorter.

Shortening intelligence processing time is a key link in the competition of command cycle between the two sides

The key to reduce the command cycle is to shorten the processing time of intelligence information , because the intelligence information processing is a complex, detailed and a lot of work which takes the most time in the command cycle. According to sources, the time spent on the battle corps command in obtaining and processing intelligence information accounts for about 70% of the entire command operation time. We can foresee that in the future of information battlefield we will achieves the advantage and initiative with the aid of intelligence information automation system to shorten the time of processing information, the enemy first step on the intelligence information processing cycle.

Time of information processing determines the response speed of weapons and the degree of damage to targets

From the perspective of the development trend of weaponry and equipment, the combination of "transmission-weapon (sensor)" and "weapon (weapon)" will become increasingly close. This is a weapon system that closely combines detection devices, fire control devices and launch devices. Through a variety of reconnaissance detection device to help identify the goal, then all kinds of information, data collected for rapid processing, calculation, makes every effort to capture and identify the target quickly and accurately, and guide and control their own combat weapons on target quickly and accurately, thus effectively release the weapon's energy and an optimum operational efficiency. In this process, the timing of the information processing determines the weapon's reaction rate and the extent of damage to the target.

Information processing time determines information timeliness

In previous wars, due to the limitation of weapon and equipment properties, the maneuvering ability and quick reaction ability of the army are relatively low, and the real-time requirement for intelligence information is not high. In the information battlefield, with the rapid development of the weapon equipment and the wildly use of new maneuvering tools, the military maneuver ability and the reaction rate are greatly accelerated. both sides of enemy strive to continuous maneuver and scatter which confuse the enemy and take the initiative to create in the dynamic. It always makes oneself to form favorable situation in dynamic enemy so that greatly enhance the effect of time: Mass of weapons destruction can almost change the forces in the direction of in an instant, the battlefield situation changes very quickly and dramatically. In this case, to gain battlefield initiative, the army must have real-time intelligence information to ensure operational capability.

THE PROBLEMS SHOULD BE PAID ATTENTION TO THE ECONNAISSANCE INTELLIGENCE IN THE FUTURE COMBAT

In modern battlefield, the high technical quality of reconnaissance and communication equipments determines largely the quality of information acquisition and transmission whose quality disadvantages are difficult to compensate with the quantity advantages.

The development of the following reconnaissance and communications equipments should be paid attention to

First is advanced reconnaissance and early warning satellites. The tentacles of information confrontation are spreading into space, and space has become the commanding heights of information superiority. Priority should be given to the development of a reconnaissance satellite carrying advanced radar, infrared, photoelectric and multi-spectrum sensors and capable of carrying out a variety of reconnaissance and surveillance missions. The priority should be given to the development of early warning satellites integrating battlefield early warning, reconnaissance and command and control functions. The priority should be given to developing small reconnaissance and surveillance satellites under 500kg to solve the problem of space reconnaissance in war zones. The second is the advanced early warning and reconnaissance radar which can detect the stealth aircraft. It aims to develop advanced reconnaissance and early warning radar such as dual-base (multi-base) radar, long-wave radar and airborne anti-stealth radar which improve the detection and early warning ability of stealth aircrafts, and provide reliable intelligence basis for operational command. Third is the main communications satellite, a series of supporting digital communications equipments. Developing, improving and perfecting digital communication equipment solves mainly the following problems that are increasing the communication capacity and the proportion of mobile communication, Improving anti-interference ability and development of various advanced terminal equipments. Advanced frequency hopping stations, adaptive stations and modular battlefield information sharing systems for use by combat units should also be developed.

The overall effectiveness of existing econnaissance and communications equipments by means should be improved.

First, we can build network with a variety of technology types of reconnaissance equipments which Based on the comprehensive application of different technical types of reconnaissance equipments that are different operational principles, different working bands of reconnaissance equipment cross configuration, in order to obtain the information of different characteristics of the combat target to ensure the overall effectiveness. Second, we can allocate the reconnaissance equipments in multidimensional space to improve the overall effectiveness. When we make the reconnaissance equipments to configure a reconnaissance net, we should think about the requirements of technical performance and actual combat which make reconnaissance and communications equipments in different spaces of land, sea, air and sky to acquire information at

different distances and making mutual complementation each other. Third, we should build the communication links that are multiplexed. In other words, We establish a war zone communication network with the communication satellites, radio stations, cable relays, optical fibers and other information transmission links that achieve inter-connectivity of communication links within the war zone and increase roundabout links by expanding the number of information channels. It can ensure this "break" and that "pass" to improve the overall communications effectiveness. Fourth, we should set up a relatively independent reconnaissance and communication systems. The regional reconnaissance and communication system with reasonable structure, perfect function and strong anti-interference and anti-destruction capability is selected to improve the ability of information acquisition and transmission.

The problems should be paid attention to the reconnaissance intelligence in the future combat

We should pay attention to expanding channels to ensure the intelligence and communications security. We should give full play to the role of the people, especially in local operations, and make full use of civilian information equipment to provide relevant information to the armed forces, so as to make up for the insufficiency of their reconnaissance and communication capabilities. The specific measures are as follows: One is to obtain information through network reconnaissance. In view of the characteristics of military and civilian sharing of the computer network, we should organize the civil computer experts and hackers to take advantage of the technical and management vulnerabilities of the other side to gain information through the command and communication networks of the other side. Cyber sleuthing is difficult that is possible and will yield valuable intelligence. The second is to use the Internet and mobile phones to deliver intelligences. There are

a large number of computer network users and mobile phone users in China which are rapidly increasing. If the war happens, we can build the large communications networks by special web addresses and mobile phone numbers. The intelligence that the public obtain could be sent to military websites or numbers by Emails or text messages, MMS, etc. It is fast and effective way that we can use the Internet or mobile phone to transmit information. In the same time the information sources are expanded largely.

SUMMARY

As advanced technology continues to be applied to the military, the operational tempo is getting faster and faster. Some new features of intelligence collection and processing have emerged, such as the wide range of information collection content and the corresponding increase in collection means. At the same time, the impact of intelligence-gathering and processing effectiveness is growing largely. The second is to decide the reaction speed of the weapon. Third, improve the timeliness of intelligence information; Fourth, enhance operational effectiveness. Therefore, we should start with the research and development of advanced reconnaissance and communications equipment, the improvement of the overall efficiency of existing related equipment and the expansion of intelligence and communications support.

REFERENCES

- G. Eason . A generalized approach to fuzzy optimization.[J]. International Journal of Intelligent System, April 1955.
- C.P. Bean. A Monte Carlo Model for military Analysis[J]. Operations research for Management, April 2005.
- R.Nicole. A generalized approach to fuzzy optimization [J]. Joint Vision 2010 Joint Forces Quarterly(JCS), August 2008.