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New Technologies and Decision-Making for the Military

Gérard de Boisboissel

"One should act as a man of thought and think as a man of action".

Henri Bergson

Abstract

This chapter aims at reviewing the concept of decision-making on the battlefield for military leaders. Thus, it intends to address the changes implied by the use of new technologies (such as Robots, AI) that will gradually invade the battlefield. The leader of tomorrow will have to quickly manage remote information and keep control of high performance automated systems integrating a certain form of autonomy, including lethal autonomous weapon systems. He must ensure that a global meaning is given to the military action taking place on the battlefield. He has to be able to command to achieve his goals.

Keywords: military, leader, decision-making, decision aid, technology, autonomy, AI

1. Introduction

If the qualities required of a leader to be a good commander and a good decision maker remain constant in human history in the face of the complexity of the battle, the leader of tomorrow will have to adapt to the uses of new technologies. This will allow him to be better informed, and consequently to be more reactive in order to keep the initiative in the manoeuvre, but also to carry his action further and delegate certain tasks to the machines he will have at his disposal. Such adaptations are not trivial, because they reconsider the existing military doctrines, and can call into question the very principle of the hierarchy that makes the strength of armies. It is therefore necessary for the military to know how to use these new technologies through training, but also to know how to keep control of the use of new systems integrating a certain form of autonomy. Above all, it is important for the military leader to preserve the very essence of his very identity: to give meaning to military action and command to achieve his goals.

2. Commandment

Primarily, a military leader must command, which implies legitimate decision-making authority and a responsibility towards the soldiers entrusted to him for the mission which he must ensure.

The command is the very expression of the personality of the leader. It depends on the tactical situation which includes the risk and the obligations of the mission to be carried out.

To be a good military leader implies several additional qualities: to be demanding, to be competent, to have a high moral strength in the face of the difficulties of war, to have confidence in his own abilities and in those put at disposal, to be in responsibility to assume his decisions and for that to put in responsibility his subordinates, and finally to be able to decide in complete freedom.

He is the one who decides and commands. He is the one to whom all eyes turn in difficulty [1], but the exercise of his command requires a demanding discernment between reflection and action.

3. Decision

The military world is very demanding and dangerous. Having to take into account the danger for his soldiers, the danger for himself and the responsibility of the mission he has been given, the military leader should:

- discern in complexity (deploy true situational intelligence);
- decide in uncertainty (have the strength of character to accept calculated risks);
- act in adversity (to unite energies, encourage collective action and make conscious decisions);

This forms the basis of the educational project of the Saint-Cyr Coëtquidan military academy, and perfectly synthesises the objectives of a training system adapted to the officers of the 21st century. However, this initial training must take into account the technological evolutions allowing military decision-makers of today and tomorrow to reduce the fog of war.

3.1 Military leader is accountable for the decision

What is decision-making for a military officer? It consists of choosing between different possibilities and opting for a conclusion among the different possible solutions, while having analysed all effects that this decision implies.

In order to decide, the leader must master the various areas listed below: a perfect knowledge of the mission entrusted to him, of the means at his disposal and of his troops. Nothing is worse than indecision when the lives of soldiers are in danger. His decision must call for moral and intellectual courage.

“The unknown is the governing factor in war” said Marshal Foch. However, the role of the leader is above all to be able to adapt and modify his analysis and the behaviour of his troop in order to respond to unforeseen situations. This ability to adapt is essential to maintain the freedom of action that allows for initiative on the battlefield, and to be able to innovate according to the constraints.

The leader must show discernment in action, to appreciate facts according to their nature and their fair value. This implies being cautious in his choices and the scope of his choices.

Finally, the leader must be lucid, and control his stress, pressure and emotions. These to preserve his “esprit d’initiative”.

3.2 Information, the key to victory

To meet all these requirements, information is one of the major foundations for the exercise of the command of the chief. It is the keystone of all military action, to keep the initiative and maintain supremacy on the ground [2].

In fact, information allows the chief to plan the military action, taking into account the means at his disposal, ensuring the transport logistics, and confronting the possible friendly and enemy modes of action in order to determine the manoeuvre that he will conduct.

The management of the information received is reflected “*en conduite*¹” by the regular rhythm of reports and situation updates to higher or subordinate levels, in order to anticipate threats and maintain a capacity to react as quickly and efficiently as possible in the face of adversity or any obstacle hindering the manoeuvre.

For the decision-making process to run smoothly, the information must be updated regularly because the situation can change very quickly and the leader will have to adapt his analysis accordingly.

Thus, there is no single decision of the military commander in operation, but a continuum of decisions, some of which are almost routine or implicit, while others require extensive analysis. Some decisions are ultimately critical, as they can result in a favourable or tragic outcome to a given situation.

4. What is fundamentally changing

This chapter addresses the change in the art of decision-making for a military officer, implied by the use of some technologies that will gradually invade the battlefield.

Indeed, some technologies will allow the leader to be better informed, but also to be more reactive in order to keep the initiative. Their management requires a mastery of new data management processes resulting from the digitisation of the battlefield, in particular the possible influx of operational data from the field and their synthesis for the military leader.

4.1 A more accurate and faster remote information acquisition

The one who sees further and before the others is the one who dominates the military manoeuvre. This is what enables him to gain a tactical advantage because the one who acts first with determination is most often the one who wins. Moreover, the ability to see further and more accurately thanks to remote sensors or cameras brings an undeniable advantage to the military leader, enabling him to react faster than his enemy.

Today, spaces are getting tighter, and information can be transmitted in a few milliseconds to any point on the planet, provided that the sensor capturing the information is available. This is done through cyberspace which must be secured for military forces so that they can be sure of the veracity of the data they use. This immediacy of information is a new parameter in the art of command. It forces the leader to make a quick analysis and to be reactive in his response.

It also raises the question of his capacity to process the information, if there is too much data to process. In this case, it will be necessary to process automatically the data as soon as it is received by the systems, to extract only the relevant

¹ “*en conduite*” is a French expression literally translated by “while driving” which means to decide while the military action is taking place.

information. And if these systems are unable to do this, the leader will have to be assisted in the analysis and decision-making by a third party, which may also be a machine. This raises the question of the control of these decision aids provided and which he must rely on.

4.2 Act remotely to remove the danger and increase the area of action

One of the major military revolutions that began at the start of the 21st century in the Iraq and Afghanistan wars is the robotisation of the battlefield. It is unavoidable and will gradually be introduced into the battlefield because the use of unmanned robots (UAV, USV, UUS and UGV) offers many advantages to the armies that will use them on the ground.

Firstly, it avoids exposing our own combatants, which is all the more important in our modern armies where the latter are a scarce and expensive resources to train.

Secondly, it extends the area of perception and action of a military unit. In a sense, they are the “5 deported senses” of the fighter, i.e. his eyes (camera), his ears (reception), his mouth (transmission), his touch (actuator arm) and even his sense of smell and taste (detection of CBRN products).

As tools placed at the disposal of the combatant, robots will allow him to control the battlefield by deporting effectors or sensors allowing a control of the various dimensions and spaces of the battlefield, on land, in the air, at sea and even electromagnetically. These will thus progressively move the combatant behind the contact zone, in order to move him away from the dangerous area and reduce the risks, or allow him to dive in with the maximum of means at his disposal, thus significantly reducing the vulnerability of the combatants [3].

Finally, the ability to act remotely while preserving the lives of his men will allow the leader to act even the enemy can even deploy his forces for his manoeuvre.

Robotic systems will thus become new tactical pawns that the military leader will now use to prepare his action, to facilitate his progress, allowing him new effects on the enemy, the terrain, the occupation of space and on the rhythm of the action. Especially since these machines will eventually be more efficient, more precise and faster for specific tasks than a human being can be. This is currently evident in industrial manufacturing and assembly plants.

4.3 The disruption of autonomy

This military revolution of deporting action with robotic systems is accompanied by another, no less disruptive, that of the autonomy of these systems. Autonomy will allow for omnipresence of action in the area, 24 hours a day, subject to energy sufficiency. It will allow the machines to adapt to the terrain and its unforeseen events in order to carry on the mission entrusted to them by the military leaders. Autonomous systems will allow them to react to complex situations by adapting their positioning strategy, and even adapting the effects it produces on the battlefield. For example, it may be an automatic reorganisation of the swarm formation adopted by a group of robots to follow an advancing enemy, followed by the decision to block an axis of progression with smoke or obstacles to hinder enemy progression.

However, autonomy is not fundamentally new for a leader. A section or a platoon leader has combat groups under his command, whose group leader who receives a mission has full autonomy to carry it out. The new fact is that if robots are tactical pawns at the disposal of the combatant, and if they can have a certain form of

autonomy in the execution of their action, they do not have and will never have the awareness of their action and the capacity of discernment which are characteristics of the human being. This opens up a number of ethical questions regarding the opening of fire that will not be addressed in this chapter (See [3]).

5. The contribution of new technologies to military decision-making

These upheavals are based on technologies that create new opportunities in military decision-making processes.

5.1 All deployed systems are interconnected

The digitisation of the battlefield stems from the constant trend towards the integration of electronic components in all future military equipment, which, coupled with a means of transmission, allow for their interconnection and the dissemination of the information collected. It affects all systems deployed in the field (from weapons systems to military vehicles), right down to the disembarked combatant who, just like any civilian with a smartphone, will be connected to the great digital web of the battlefield and therefore traceable and reachable. Just like every individual in the civil society, every actor on the battlefield is traceable and able to communicate.

5.2 Enriched information

As explained above, technology will enable a faster detection of threats on the battlefield. The Law of Moore has sometimes been used to describe the increase in the capabilities of digital cameras, according to a ratio of “twice as far” or “twice as cheap” or “twice as small” every 3 years. In fact, each innovation allows to see further for a smaller footprint. The digital zoom allows high magnifications but at the cost of algorithmic processing of the image which causes lesser definition quality. It is often paired with the optical zoom, which consists of adapting the focal length to the target you want to look at. Cameras can now merge data from multiple sensors of different types. In particular, thermal imaging allowing you to see a large fraction of the spectrum and to view and measure the thermal energy emitted by an equipment or a human. To which one can add light intensification processes to amplify the existing residual light to recreate an image usable by the human eye, in low light conditions.

All of this fused data can enrich the field of vision of the combatant by superimposing additional data that completes his knowledge of the tactical situation. This is the principle of augmented reality.

5.3 The immediacy of information processing

If data acquisition and transmission is possible, the information should nevertheless be processed. However processing it requires easily accessible hardware and software resources offering the necessary computing capacity to react as quickly as possible, particularly in order to be extremely reactive in situations where the analysis time is too short for a human to do it by himself. Embedded computer software can provide such capacity at the core of deployed systems, but this capability can also be moved to a secure cloud, which can be both a tactical cloud, i.e. a cloud deployed on the battlefield in support of the manoeuvre, or to a further away, highly sovereign and secure cloud.

5.4 To the detriment of human decision-making

This immediacy of information processing allows a hyper-reactivity of systems, foreshadowing the concept of “hyperwar” formulated by General John Allen & Amir Hussain Allen in 2019, which puts forward the idea that the advent of hyperwar is the next fundamentally transformative change in warfare.

“What makes this new form of warfare unique is the unparalleled speed enabled by automating decision-making and the concurrency of action that become possible by leveraging artificial intelligence and machine cognition... In military terms, hyperwar may be redefined as a type of conflict where human decision-making is almost entirely absent from the observe-orient-decide-act (OODA) loop. Consequently, the time associated with an OODA cycle will be reduced to near-instantaneous responses. The implications of these developments are many and game changing²”.

5.5 A support for information processing

For information processing, the volume of data produced increases exponentially and the accuracy and granularity of the data produced by sensors grows. This trend will become more and more pronounced over time [4].

Military experts usually process observation data retrieved from the battlefield by satellites, reconnaissance aircraft, drones or sensors abandoned on the ground. However, as human resources are scarce and the volume of data is constantly increasing, it will be necessary to delegate the processing of this amount of data to AI algorithms in support of the human being, at the risk of not being able to process all of them without this technology.

On the ground, the deployed combatant will be increasingly charged cognitively by the complexity of the systems to operate and the amount of information to process. It will be vital to automate the processing of certain information in order to unload it, so that only what is really necessary will be presented. This needs to be done in an extremely ergonomic way. This requires defining which data can be subjected to artificial processing, and up to what hierarchical level their processing can be automated.

5.6 The contribution of artificial intelligence

Automated management of routine, repetitive and time-consuming procedures could emerge. In a headquarters, for example, reports management and automatic production of summaries adapted to the level of command would immediately make the chain of command more fluid. The AI could take the form of a dashboard to stimulate the reflection of the commander and his advisers by dynamically delivering relevant information and updated statements [5].

During operational preparation, depending on the tactical situation, the leader must confront the possible modes of action he envisages with the reference enemy situation and the possible enemy modes of action. Very often he does not have the material time to confront his action with several enemy modes of action, and he only anticipates certain non-compliant cases that he considers probable. Artificial intelligence could be more exhaustive in confronting more possible modes of action of the enemy, and thus present a more complete analysis of possible options to the military leader who could then decide accordingly.

² <https://www.fifthdomain.com/dod/2017/08/07/emerging-hyperwar-signals-ai-fueled-machine-waged-future-of-conflict/>

The field is wide, and even more infinite. A new question then arises: for new technologies, is a new way of command needed?

6. Reduction of the OODA decision cycle

The technologies listed above have a direct effect on the OODA decision cycle, which will be profoundly impacted by the new technologies.

This concept was defined in 1960 by an American military pilot by the name of John Boyd to formalise the decision cycle in air combat. It has since been used to schematise any decision cycle. The author will use it here in the light of the potential offered by the technologies detailed above (**Figure 1**).

6.1 Observe: a better detection

“Seeing without being seen” is essential in military operations, and remains a common adage. Technology is helping, with the extended distances made possible by long-range cameras and their deportation to robotic systems. It can now also help to overcome several natural detection constraints such as night, fog or walls.

Moreover, digitised systems can operate 24 hours a day with great consistency, where humans are subject to fatigue and inattention, avoiding the risk of missing information.

For surveillance or patrol missions, where human resources are often lacking, the leader can delegate to systems the analysis of images of the area for the detection of movements and the potential presence of enemies. It should be noted that this detection should filter out false alarms as much as possible, such as the movement of leaves in the trees when the wind picks up.

6.2 Orient: a better analysis

Remotely seeing will make it possible to identify a potential target from afar, to discriminate it (is the target a combatant) and to characterise its behaviour (is it hostile or not). If these criteria are met, the target becomes a potential target that can easily be geolocated, this information will then be transmitted to the

Figure 1.
OODA cycle time reduction: A better reactivity.

decision-making levels. The gain here is that of anticipating the analysis for better decision-making.

The leader will also be able to rely on the automatic processing of data acquired within the digital environment of the battlefield. Faced with the potential 'infobesity' of the battlefield, artificial intelligence will enable massive data processing, subject to the availability of a computing capacity directly embedded in remote robotic platforms, or by remote processing of information via long-distance communications. It will allow constant monitoring of the analysis of captured images or sounds, a task that the best human experts can only supervise because they are subject to fatigue and inattention. This is particularly the case with satellite images or images captured by surveillance drones, which can monitor an area 24 hours a day. Finally, it will also enable the detection of weak signals that would be invisible to humans, by correlation between several distinct events, or by cross-checking.

There are still two essential components to the analysis of the situation that a machine can never integrate. Firstly, instinct and intuition, which a machine cannot have and which are the fruit of a life-long learning of human experience, and secondly, the transcendence of military action which only a metaphysical dimension in the literal sense can provide.

6.3 Decide: a better reaction

The military commander is the decision-maker for military action. It is therefore up to him to take the decision according to the information at his disposal. He can of course rely on a deputy or on operational advisers who help him analyse the situation, if time permits.

For example, France is intervening in Mali and the Sahara as part of the *Barkhane* military operation to combat Salafist jihadist armed groups infiltrating the entire Sahel region. Launched on 1 August 2014, this operation replaces operations *Serval* and *Épervier*. The following scenario is fictitious: an armed Reaper drone of the French army flies over a region of the Malian desert at night and its cameras (incorporating AI for automatic motion detection processing of the captured images) detect a suspicious movement. The sensor operator of the drone is alerted and zooms in on the area to detect a jihadist 4x4 occupied by armed personnel via its Infrared camera. This vehicle is moving towards a village 20 kilometres away. Setting up an operation with Special Forces is not possible because they are not in the area, and there is a great risk that the occupants of the 4x4 will disperse once they reach the village. The legal advisor on duty quickly confirms the possibility of the drones firing on the target because no collateral damage is possible in this desert area. The head of the operation decides to give the order to fire the drone.

This example clearly shows the drastic reduction in the OODA decision cycle offered by the new technologies: the chief detects and is informed as soon as possible by an automatic detection of a suspicious movement of an enemy vehicle. He confirms with his image operator the Positive identification (PID) of the target as an enemy. He then reports it to his hierarchy and receives the order to open fire. He can thus, in compliance with IHL, open fire from a distance. The enemy has not even spotted him.

There are still situations where time is critical and the leader will not have time to make a decision due to the rapidity of the attack. The automation of response processes then becomes a possible option, i.e. he can delegate to a machine the possibility of giving an appropriate response to a situation by itself. This is already the case with missiles or ballistic threats, which require armies to use automatic systems to counter them. This requires automatic systems that are faster and more precise than human beings (e.g. coupling weapons and radar). Tomorrow, faced with future systems

that will develop unpredictable trajectory strategies (enemy missiles with AI), faced with saturating threats that risk overwhelming our defences, faced with swarms of offensive robots, our systems will have to adapt in real time to counter the threat. Only a certain autonomy of the defensive systems will make it possible to face them, an autonomy which will have to remain under the control of the leader having these systems at his disposal.

6.4 Act: a quicker and more accurate reaction

A quicker reaction: A man reacts in a few seconds, the machine in a few milliseconds or less. Where a human thinks in a few seconds for the best, the machine will analyse parameters in a few milliseconds and propose a response in near real time.

A more accurate action: A human shooter who moves, breathes and shakes is less accurate than a machine that does not move, breathe or shake because it is not subject to emotion. Precision in action will therefore increasingly be the prerogative of the machine.

The outcome of a fight or a counter-measure may depend on these factors 10 or 100 seconds to a thousand seconds.

7. Technology as a decision aid for the leader

Military decision-making is centred on the military leader, because he is at the heart of the command situation. He takes responsibility for military action, a mission given to him by the legitimately elected political power.

The leader must therefore control the decisions taken within the framework of military action because he is the guarantor and he assumes the consequences.

What lessons can one learn from the opportunities offered by new technologies for military decision-making and the possible resulting changes in the art of command?

7.1 To reduce the “fog of war”

The leader must rely on technology to reduce the uncertainty and fog of war. It will allow him to be more aware of his tactical situation by searching for intelligence. Furthermore, it will enable him to delegate to machines the management of repetitive tasks that do not require constant situational intelligence.

Depending on the circumstances and if he has time to reflect, the digitisation of battlefield information will also allow the leader to replay certain possible scenarios before taking a decision. Finally, it will give him the possibility to select the information he has received that he deems important, to view it several times (especially if the information is imprecise) before making a decision.

7.2 For decision support

A digital aid will be welcome to synthesise the multiplication of digital actors on the ground with whom he is in contact, or whom he must command or coordinate as a leader.

One of the consequences of the digitization of the battlefield is that it may lead to information overload for the leader who is already very busy and focused on his tasks of commanding and managing. It is already accepted in the military community that a leader can manage a maximum of seven different information sources at the same time, and even less when under fire.

Delegating is one way to avoid cognitive overload. Thus, one possible solution is to create a “digital assistant” who can support the leader in the information processing steps.

His digital deputy can be a digital assistant, an autonomous machine that will assist the leader in filtering and processing information, which will help the leader in the decision-making process.

Nevertheless, the leader will have to fight against the easy way out, take a step back, allow himself time to reflect, and reason with a critical sense when faced with machines that will think for him. This process will help him fight against a possible inhibition of human reasoning. Artificial intelligence does not mean artificial ignorance if it is used as an intellectual stimulant, although it can have this flaw.

7.3 For an optimization of its resources

The chief will be able to entrust machines with the execution of certain time-consuming and tedious tasks, such as patrols or the surveillance of sectors, and thus conserve his human resources for missions where they will have a higher added value.

The same applies to missions that require reactivity and precision, especially if there is a need to be extremely quick to adapt to the situation. For example, it will be useful in the case of saturating threats, where targeted destruction or multi-faceted and omnipresent threats such as swarms of drones must be dealt with.

8. But technology as a decision aid subject to control and confidence

Delegation of tasks to increasingly autonomous machines raises the question of the place of humans who interface with these systems and should stay in control.

8.1 The leader must always control execution of an autonomous system

At first, the military will not use equipment or tools that they do not control, regardless of the army in the world. Every military leader must be in control of the military action, and for this purpose, must be able to control the units and the means at his disposal. He places his confidence in them to carry out the mission, which is the basis of the principle of subsidiarity.

For this reason, it is not in his interest to have a robotic system that governs itself with its own rules and objectives. Moreover, this system could be disobedient or break out of the framework that has been set for it. Thus, machines with a certain degree of autonomy must be subordinate to the chain of command, and subject to orders, counter orders, and reporting [6].

8.2 Operators must have confidence when delegating tasks to an autonomous system

The military will never use equipment or tools that they do not trust. This is the reason why a leader must have confidence in the way a machine behaves or could behave. For that, military engineers should develop autonomous systems capable of explaining their decisions.

Automatic systems are predictable, thus, one can easily anticipate how it will perform the task entrusted to it. However, this becomes more complex with autonomous systems, especially self-learning systems where one may well know

the objective of the task to be performed by the machine, but has no idea how it will operate. This raises a serious question of trust in this system. As an example, when I ask an autonomous mowing robot to mow my lawn, I know my lawn will be mowed, but I do not know exactly how the robot will proceed.

The best example to focus on are the expectations of the soldier about Artificial Intelligence embedded in autonomous systems.

AI should be trustable. This means that adaptive and self-learning systems must be able to explain their reasoning and decisions to human operators in a transparent and understandable manner;

AI should be explainable and predictable: one must understand the different steps of reasoning carried out by a machine that delivers a solution to a problem or an answer to a complex question. For this, a human-machine interface (HMI) that explains its decision-making mechanism is needed.

One must therefore focus on more transparent and personalised human-machine interfaces for the operator and the leader [6].

9. The risks inherent in the use of new technologies for military decision-making

9.1 Tunnel effect

Easy access to information or possible information overload both favour a possible tunnel effect. This effect, due to a sudden rise in adrenaline, causes a failure in the analysis of signals and data received by a brain that is no longer able to step back and analyse the situation. For the military, this tunnel effect is clearly the enemy of the soldier who has to concentrate on a screen, on a precise task, forgetting to look at the enemy threat around him and thus exposing himself seriously. It is also the enemy of the leader who, because he focuses on a piece of information that he finds crucial, becomes unable to step back and fulfil his role as a leader, which is to take into account the globality of the military action, and not one of its particular aspects highlighted by this information. Too much information should not prevent the commander from stepping back and reflecting.

The question of the gender of the soldier operator may be an avenue of exploration here, as women may have the capacity to manage several tasks simultaneously better than men.

9.2 Inhibit the action

Easy access to information encourages another possible flaw in decision-making. That of not deciding anything until one has all the information at his disposal. This flaw can probably become a major concern in the future. With the responsibility of the soldier at stake, he may hesitate until the last moment to take a decision because he lacks information that he can hope to recover by technological means. This is the death of daring, of manoeuvre by surprise, which often ensures a victory for the leaders who dare to practice them.

9.3 AI will influence the decision of the leader

Stress is an inherent component of taking responsibility. It is common for a military leader to have the feeling of being overwhelmed in a complex (military) situation. In such contexts, the leader will most often be inclined to trust an artificial intelligence because it will appear to him, provided he has confidence in it, as a

serious decision-making aid not influenced by any stress, having superior processing capabilities, and able to test multiple combinations for a particular effect.

9.4 Too much predictability in operational decision-making patterns

The modelling of human intelligence by duly validated but very fixed algorithmic processes can lead to the inhibition of human intelligence. In particular, there will be a risk that military thinking will be locked into decision-triggering software. In other words, the formatting of military thought into controlled and controllable decision-making processes, developed by the need to respect the rules of engagement and international rules, particularly those of the decision to open fire. The processes will certainly be validated, but once activated, these processes may become completely rigid technological gems, admirably designed, but incorporating doctrinal biases that cannot be challenged in the face of unpredictable enemy behaviour [7]. By the time, these systems and their uses are adapted, it will be too late and the battle will be lost.

Another major risk is the predictability of the behaviour of these systems by the enemy. As these systems are known, their vulnerability will also be known. It will therefore be easy for the enemy to circumvent them by manoeuvres combining cunning and opportunity, with victory only reflecting the inability of these highly technical systems to adapt to an unpredictable or simply illegal conflict.

The leader must therefore anticipate these pitfalls and use the means at his disposal with intelligence. On these aspects, the French army has developed the concept of “major effect” to be achieved. This major effect conceptualises the way in which the leader intends to seize the initiative in the execution of his mission and which makes it possible to adapt the means and methods of execution to the final effect sought [8].

9.5 A principle of subsidiarity undermined

As a corollary to the extraordinary potential of the digitisation of the battlefield, namely to allow all levels of the hierarchy to access information in real time and simultaneously, there is also a new risk at every level of the military hierarchy: that of the leader having the possibility of directly accessing ‘target information’, thus breaking the principle of subsidiarity, which requires him to delegate to his subordinates the responsibility for and the use of the means made available to him. The temptation to interfere in the decisions of subordinates and to decide in their place will be great, given his experience and his position. In order to avoid this possible risk, it will be necessary to define precisely the right level of information to be communicated for the right strategic level, in order to respect the freedom of action of each level and to avoid a general and systematic dissemination of information without intermediate processing and filtering.

10. Conclusion

“The philosophy of war does not change. It will not change as long as it is men who make war” said General Charles de Gaulle.

In spite of everything, new technologies bring new equipment to the forces in operation. They are transforming the art of waging war through the opportunities they offer and by the new uses they bring to the battlefield.

With these new means at his disposal, the leader must continue to ensure the delicate balance between reflection and action. Without real and concrete

commitment, there can be no good understanding of the situation, and without hindsight, there can be no good decisions [9].

This balance can only be achieved through advanced training. Firstly, human learning, to know how to command his men and respect the opponent. Secondly, intellectual learning, because he must understand the technologies he will use on the battlefield. Military training, because war is an art that leaves no room for the unexpected and requires skills and qualities that are acquired through effort, courage and performance training.

It is this leader of tomorrow that the French Military Academy of Saint-Cyr Coëtquidan is training in Brittany, in the western part of France.

Glossary

AI	Artificial Intelligence
CBRN	Chemical, Biological, Radiological and Nuclear
HMI	Human-Machine Interface
OODA	Observe-Orient-Decide-Act
PID	Positive Identification
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
USV	Unmanned Surface Vehicle
UUS	Unmanned Underwater Vehicle

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