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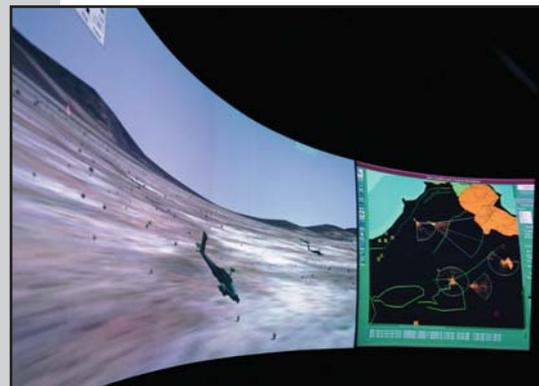
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# Knowledge warfare

Dr Carlo Kopp

*"Knowledge is power"  
Sir Francis Bacon,  
English Author  
and Philosopher,  
Religious Meditations,  
Of Heresies, 1597.*

**E**merging earlier this decade, the idea of 'Knowledge Warfare' – as distinct from Information Superiority, Information Warfare and Network Centric Warfare – has not attracted the attention it deserves. Failure to appreciate how advantages in knowledge can confer advantages in combat could mean that the vast long-term investment in ISR and NCW capabilities might be squandered. Initially, there may be little to distinguish between these terms but the reality is that each has very distinct and different meanings, and impact. The best starting point is to look at the idea of Information and why it matters.



## Information - What is It?

Information is crucial to the functioning of all systems. This is because information facilitates economy of effort - knowing something usually provides opportunities to do it more efficiently or faster. Therefore, information has value attached to it. How important that value depends largely on what that piece of information allows a 'player' to do.

In the pursuit of war, information has always been of high value, and this was true in conflicts predating the Roman and Greek eras. Knowing or not knowing an opponent's location, strength, capabilities, condition, reserves and intent have more than often been the decisive factor in victory or defeat. Many wars have started or been lost due to misperceptions of a potential opponent's strength or weakness.

The advent of modern mechanised warfare during the last century increased the importance and value of information. Large, fast moving formations on land, at sea and in the air delivered enormous firepower with increasing precision as smart weapons were developed during the 1940s and subsequent decades. Knowing the strength and location of one's own forces and the opponents' forces became vital to performing all manner of operations. To find targets and destroy them, the mechanised military machine had to be fed with a continuous stream of information. The capacity of mechanised forces to manoeuvre rapidly produced enormous pressures for timely information.

When we talk about information, the term is often interpreted in different ways - and many network centric warfare theorists have added their own unique interpretations. At the most fundamental level of Shannon's mathematical information theory, or Ashby's model, the measure of information in any message is its unpredictability: if you know what a message contains before you observe it, it has zero information content. If everything in the message is new to you, it has a very high information content. In a fundamental sense, how much information exists in any message depends on the prior knowledge of the observer.

To illustrate this, consider a situation where as an observer you are presented with a batch of reconnaissance photographs of a site of interest, taken each one day apart. When you observe the first of these, it has a high information content since you are absorbing the whole image, and everything in it. If the image taken a day later is identical, it has no information content to

you as an observer, other than the knowledge that no change has occurred. If the image includes a trench dug overnight, or enemy encampment, then the information content in the image lies in the changes observed, not the image itself.

A common mistake found in many discussions or indeed interpretations of the idea of information in warfighting is the basic misconception that digital data is information. Digital data usually contains some information, but how much depends on the observer, and the content of the data. For instance, a mailbox full of identifiable spam will have no information content to most observers as it is utterly predictable trash.

So in simple terms, data is not information, but may contain information. What constitutes information depends on the observer, and how unpredictable a message is to that observer.

This brings us to the idea of Knowledge, and why it matters.

## Knowledge - What is It?

The Oxford English Dictionary defines knowledge as "(i) facts, information and skills acquired by a person through experience or education; the theoretical or practical understanding of a subject, (ii) what is known in a particular field or in total; facts and information or (iii) awareness or familiarity gained by experience of a fact or situation."

Wikipedia points out that, "Philosophical debates in general start with Plato's formulation of knowledge as 'justified true belief'. There is however no agreed definition of knowledge, nor any prospect of one, and there remain numerous competing theories."

These manifold definitions point to the reality that knowledge is a measure of the understanding or ability to understand specific information, and the ability to interpret the implications of that information properly. Put bluntly, an observer with knowledge can make proper sense of information and exploit it to an advantage, whereas an observer without knowledge cannot.

Whether we look at knowledge from a commonsense perspective, or a scientific perspective, the underlying reality is simple – players with knowledge can make better use of a given item of information than players without knowledge.

This is a very basic idea but one more than often lost in the 'information age' debate on military strategy.

## Knowledge versus Network Centric Warfare

The history of war permeates with instances of a player using superior knowledge to gain an advantage, often against a more powerful opponent, thus winning engagements or conflicts. This has been described in blunt terms as 'outwitting the opponent'.

The idea is that the more knowledgeable player is better able to anticipate his opponent's moves and deployment, and better able to deploy his assets, thus he gains an advantage in being able to decide faster and better on a course of action. In this fashion he drives his opponent into a position of such disadvantage, that the engagement or conflict is won over the opponent.

Much of Boyd's OODA (Observation Orientation Decision Action) loop theory revolves around the ability to collect data faster than an opponent, extract information and interpret information faster than an opponent, decide faster and then act faster than an opponent. The end result is that the player with the slower OODA loop increasingly lags the player with the faster OODA loop, resulting in the slower player making increasingly irrelevant, and indeed predictable decisions. The result is that the player with the faster OODA loop makes good decisions with good combat effect, to the detriment of the slower player who eventually loses.

The central idea underpinning much of the fundamental thinking behind Network Centric Warfare is that of 'accelerating the OODA loop' by providing technological tools for faster Observation, Orientation and Decision. If a digital imaging sensor is used instead of a film camera, a digital network



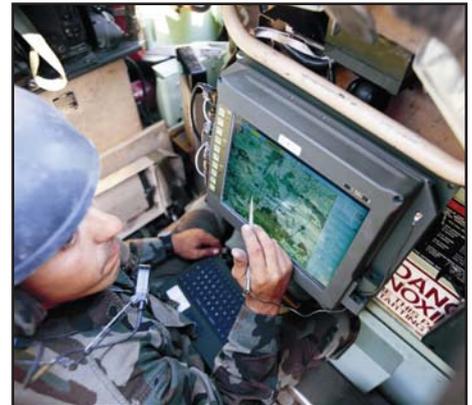
*Modern ISR and supporting NCW capabilities provide enormous potential, but achieving this potential requires a generation of smart warriors. Recruiting and sustaining such a pool of personnel will become an increasing challenge in the emerging demographic, where talent mostly migrates to occupations with high social status and earning capacity. The challenging life of a warrior is less attractive today than a generation ago.*

instead of a courier, and a computer used to aid in making faster and smarter decisions, the OODA loop is accelerated to an advantage.

### Where does knowledge fit into this model?

In a Network Centric Warfare scenario, two opponents make use of identical Intelligence Surveillance Reconnaissance (ISR) sensors, identical digital networks, and identical 'decision support' software tools, in an identical combat situation.

What differentiates scenario A from scenario B is that in A, the player making decisions has an IQ of



150, has fifteen years of combat experience, postings in several different areas, and has a deep understanding of tactics, strategy and the weapon systems in use. In scenario B, the player has an IQ of 125, little or no combat experience, most postings in one area, and an understanding of tactics, strategy and weapon systems derived from courses and doctrinal literature.

Scenarios A and B play out in parallel, presenting both players A and B with identical opponents and identical tactical situations.

Player A exploits the ISR/NCW and decision support systems, using them aggressively to divine what he is looking for in the deployment of the opponent's assets, in the opponent's moves and the opponent's reactions to his moves. Player A has deep knowledge in this area and carries a detailed picture of the engagement in his head. He could fight and win this game without the ISR/NCW and decision support systems, but uses them as tools to support his existing knowledge of the engagement, to make things happen faster and more effectively. Player A is the kind of individual at the forefront of Boyd's thinking, or Sun Tzu's for that.

Player B relies wholly on the ISR/NCW and decision support systems, using them to frame his internal picture of the opponent's assets, the opponent's moves and the opponent's reactions to his moves. Player B has a shallow understanding in this area and has difficulty connecting observations of the opponent with likely future actions, and options for actions. He could not fight and win this game without the ISR/NCW and decision support systems, and divines his understanding of the engagement from the automated systems. Player B is the archetypal example of the 'non-warrior' mind foundering in the complexity of a military engagement.

Whether Player B succeeds in winning the scenario is wholly dependent on the scenario, and the extent to which the machinery of ISR/NCW and decision support can overcome his blindness to the opponent's moves and the situational picture as it develops.

In the bluntest of terms, brains, experience and understanding are required to drive an ISR/NCW and decision support system to an advantage in combat – and that amounts to better knowledge warfare.

During the 1980s Air Marshal David Evans, then Chief of Staff of the RAAF, observed that putting a donkey into an F/A-18 doesn't make him less of a donkey – the F/A-18 then being the most highly automated fighter in the market. Air Marshal Evans then identified perhaps one of the central challenges we now face two decades later: the issue of recruiting and maintaining a cadre of warriors who have the brains, experience and understanding to exploit, if not keep up with the rapid flow of information characteristic of information age combat.

A major concern arising today is that of NCW zealots not understanding the deeper reality that superior information gathering and distribution capability requires a superior capability to understand, interpret, value and exploit information in combat. There seems to be common belief that Information Superiority automatically confers a

*Exploiting the vast opportunities presented by modern ISR and NCW requires smarter warriors. The notion that advanced technological capabilities to gather and disseminate information can somehow offset any reduced ability in weapon systems and personnel is not realistic.*

decisive advantage in combat, without connecting the issue of Knowledge into the equation. Put bluntly, vociferous NCW followers focus on the machinery of NCW without arguing for the investment into smarter warriors able to exploit the technological bludgeon of a well functioning NCW 'systems of systems'.

To play the NCW game successfully, a military Service has to have the prerequisite of a cadre of command and staff personnel with the knowledge to exploit the faster flow of information, and the necessary ability to interpret that information and orient themselves faster than the opponent. In the end, outthinking the opponent requires a better understanding of the situation, and digital wonders contribute only a part of that understanding.

A major issue for all developed nations is a shifting workforce demographic, in which smart young people are increasingly inclined to opt for careers that provide them with the best long term opportunity for social advancement, with a minimum of effort expended in the process. In the tertiary education system, this manifests in high achievers aiming increasingly for careers in medicine and law, at the expense of other professions, especially the sciences and engineering. The profession of the warrior does not have the aura it did during the 1940s through to the 1970s, when it could attract top talent and could easily turn less than optimal applicants away.

Another factor is that until the 1970s conscription exposed a much larger portion of the demographic to the classical military culture with its strong value system and deep focus on integrity, professionalism and sacrifice. These are values that are increasingly less popular in the contemporary demographic, across the developed world – maximising return on time invested is a far more common ethos in this era. As a result, the emotional commitment required to develop the qualities of a good warrior will only be found in individuals with a natural aptitude and inclination to the warrior role and, more than often, an early interest in the profession. The exceptional demands of the warrior profession will further narrow the accessible demographic.

Another consideration is the level of education and training in difficult problem-solving techniques that

future military personnel are exposed to through their careers. The ADF has a long history of recruiting high school graduates into officer training, rather than university graduates. The byproduct of this is an educational demographic in the officer corps that is well behind that of the US armed Services, which have recruited university graduates preferentially. While the fraction of the US officer corps with advanced university degrees such as science, engineering or strategic studies research masters degrees and doctorates is smaller than it was three decades ago, it is still much greater than that of the ADF.

While ADFA represents an excellent investment in this respect, one observer commented that the drawback is a loss of diversity in thinking process, a problem the US does not have with its breadth of different educational backgrounds in the recruitment pool. The ADF demonstrably has far too few officers with adequate, and suitable, education to perform well in complex and technically challenging staff postings, and arguably in the kind of highly dynamic and intellectually demanding command postings that come with the NCW-oriented digital age.

The notion that NCW makes no demands on the knowledge, understanding and ability of personnel to solve thinking problems quickly is a fantasy borne of lack of understanding of the relationship between information, knowledge and the OODA loop. The opposite is demonstrably true.

The greatest challenge faced by Western military Services, including the ADF, over coming decades will be in recruiting and sustaining the quality of personnel needed to prevail in information age conflicts. The knowledge edge lies in human grey matter, as much as it does in sophisticated hardware and software.

**Further Reading:**

Martin Burke, Information Superiority Is Insufficient To Win In Network Centric Warfare, <http://www.unisa.edu.au/seec/pubs/00papers/Burke.pdf>

Major RDL Knight, KNOWLEDGE WARFARE: VULNERABILITY OR OPPORTUNITY, <http://wps.cfc.forces.gc.ca/papers/csc/csc28/exnh/knight.pdf>

