

REDEFINING C4ISR & ADAPTIVE EVOLUTION OF DIGITAL INTELLIGENCE

Wg Cdr Srambikal Sudhakaran (Retd)*

C2 (Command & Control) is at the very foundation of **C4ISR**. War is a very complex affair and since there is no concept of being second in the game, every aspect of planning and execution is expected to be flawless in every which way. The term “Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance” (C4ISR) was coined by the U.S. Department of Defense (USDOD) as a more current and automation-focused derivation of the standardized military term “Command and Control” (C2), which broadly refers to attributes and systems that provide problem-solving resources to carry out missions. Most nations employ some form of C2 military structure, but a fully operational C4ISR structure encompasses more advanced and more expensive – technologies, assets, and capabilities.

The main motivation behind the conceptualization of the C4ISR framework was to “**See through the Fog of War**” and bring in **clarity** and a **sense of assuredness** alongwith **surety to the battlefield**. The Information age of the last century did evolve this framework to a broader one by upgrading it to **C5ISR & C6ISR**. While **Cyber-defense** was the 5th C, **Combat systems** was the 6th C. this definition of C6ISR still woefully falls short of embracing the actual ground realities of modern warfare.

The C4ISR framework was coined at a time when the advanced military powers were fighting under the broader concept of **Net-centricity of Warfare (NCW)**. The components of C4ISR therefore

were restricted to communication between computers to ensure command and control by delivering real-time information obtained through Reconnaissance & Surveillance. The aspect of Cyber-defense was accommodated when it was realized that there was a threat to the reliability & quality of information. When the volume of information became too big to handle in real-time, advanced automated systems took over the job of decision making & complex calculations to present to the decision makers the various possibilities to deploy and optimize their fire capabilities.

Take for example the ongoing Russian-Ukraine conflict. While it is a matter of public knowledge that the war is being fought by NATO & Russia, with US being the actual face of NATO and Russia fighting with clandestine support from its main ally China. In a sense this a unique war, where multiple wars are being fought between different countries in different domain. A layered warfare spreading across geographies & domains fought primarily with information as the main weapon. The most notable aspect of this war is that, this is the first war with some level of AI having crept into the OODA loop. The C2 family of framework still has not adapted to this modern dimension of technology led Intelligence enabled warfare. This is what we need to make explicit in our discourse on C4ISR. “Command Control Communications Computers Intelligence Surveillance and Reconnaissance” is meaningless in itself as a descriptive amalgam.

The advent of AI due to the enhanced processing ability & miniaturization of compute nodes, has led to the evolution of the concept of net centrality of warfare. Today connectedness of a system is basic pre requisite and considered mundane. The superiority of the force & metrics of success lies in its ability to take agile decisions in dynamic situations across battlefield, while ensuring minimal loss of human lives. This requires a higher degree of autonomous freedom for the digital systems as any human in the loop can significantly slow down the agility of the process

consequently defeating the very purpose of having such systems. The pre-requisite for such autonomous operation is the trust on the dependability & reliability of such decision-making process. Though a full-fledged autonomous system is still a decade away before seeing the actual battlefield, it is definitely the path to tread as far as C2 family of frameworks are concerned. It is under this backdrop that **we need to redefine the concept of C4-C5-C6 family of ISRs to a new framework which can accommodate the crucial aspect of Digital Intelligence in Military Decision Support systems.**

Command & Control shall always be the end result of whatever new framework that is coined today or in the near future. The major change has happened in the field of Communications, Computers, Cyber & Information. This has led to a generational change as far as surveillance and Reconnaissance is concerned. The next few decades will see a hybrid model of intelligence in the decision-making process. i.e., Intelligence of Humans augmented with Intelligence of Digital systems.

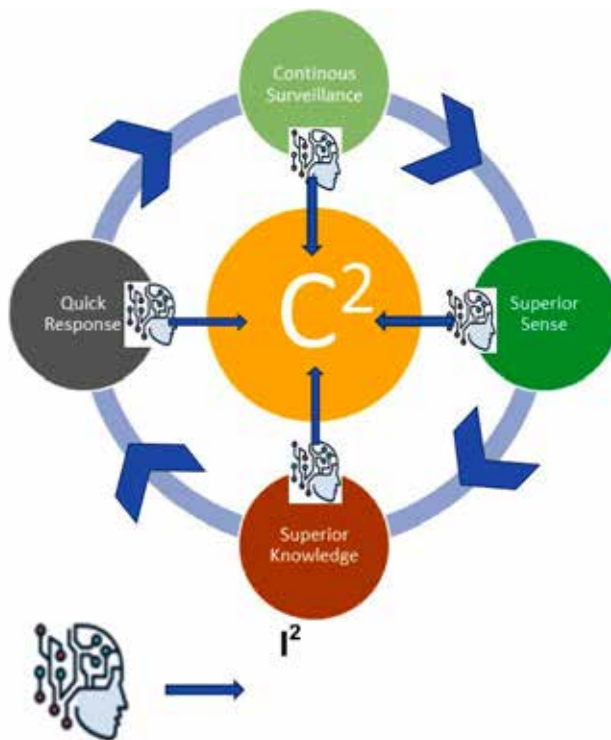
The term Intelligence as opposed to Information has a much broader connotation & consequence. Intelligence essentially means “the skilled use of Reason”. In this context the broader term **intelligence therefore encapsulates “Information, Surveillance and Reconnaissance”** to generate a set of rationale that is transformed into actionable commands. The Next generation of Intelligence enabled warfare (**IEW**) would therefore exercise Command & Control through two forms of Intelligence (Human & Machines). The term C2I2 systems therefore shall be a more practical terminology for the Military decision support framework which shall ensure seamless delivery of information flow to enhanced battlefield awareness while ensuring informed decision making. **C2I2 systems aim at enhancing our own OODA loop by acceleration of the decision-making loop, with superior information dissemination and information quality that reduce “friction of war” and “lift the fog of war.”** The exploitation of “C4” collectively by the broader “I²” as

an enabler overcomes the traditional time-and-space barriers imposed on communications & computational systems and generates a shared awareness that is able to reduce the “friction of war”.

Generation of operational knowledge seeks to establish “information superiority” for the fighting force as a whole, and serves to militate against the perennial “fog and friction of war”. This Knowledge generation when done without any possibility of Bias, vested interest or possibility of compromise by the adversary, will prove to be the perfect antidote to any trying situations that emerge in the battlefield. It is often said that “Air Superiority” & “Space Superiority” are key aspects to hold power on land. In the modern era “Information superiority” is far more vital for achieving Air superiority and Space superiority. Russia’s inability to declare victory despite being a statistically superior force is a live testimony to this fact. Information superiority can only be achieved by a superior intelligence platform.

When we refer to **Intelligence platform**, we must also look at **the concept of Intelligence holistically and at par with human intelligence in terms of its versatility & creativity**. Such systems therefore can unleash the possibility of engineering decision support platforms far beyond the capability of human minds. This is how superior platforms could come into existence at breakneck speeds which could throw in the element of surprise in a battlefield and significantly alter the consequences.

The next gen C2 framework are therefore expected to deliver commands to battlefronts seamlessly with the desired level of accuracy and speed. **Agility with adequate Quality is therefore important to exercise Command & Control in the age of Intelligent enabled warfare**. While the previous century saw radio waves bringing in the speed of light to the communication domain, this century shall be about acceleration of decision making with digital systems at comparable speeds. To achieve



this the C2 framework needs to evolve & accommodate technology frameworks in the domain of Digital Intelligence to stay relevant.

***Wg Cdr Srambikal Sudhakaran (Retd)**, is a CEO Qu Gates Technologies.