The Human Dimensions of Network Enabled Operations

The human-system interface is where the 'rubber hits the road' in Network Enabled Operations (NEOps). Without systems that are designed to be human-centric, NEOps will be a 'non starter'. Studies of command and control compatibility between human operators and the network need to be conducted. Without this human oriented emphasis, unintended consequences will emerge – just what the gurus of network centric operations were trying to overcome.

NEOps is an information superiority-enabled concept of operations that generates increased combat power by networking sensors and shooters to achieve shared awareness, increased speed of command, higher operational tempo, greater lethality, increased survivability, and a degree of self-synchronization. In effect, NEOps translates information superiority, into combat power by effectively linking knowledgeable entities in the battlespace. Up until now, the majority of the work that has been undertaken in this area, has focused on the technological challenges of NEOps, however, many of the challenges lie with the human dimensions.

The success of any military operation relies upon command and control to bring about the necessary conditions for success in military operations. In a networked force, command and control will not be the sole responsibility of any single individual. It will be a shared, distributed and a collaborative responsibility. It will be the ability of all CF elements and their allies in the battlefield *to collaborate and to synchronize their efforts* that will make or break future networked military capabilities.

While command and control systems represent the heart of networked operations, many of these systems use classical analytic decision-making paradigms as their principal design foundation. This reflects the influence of prescriptive models of automated command decision-making. Unfortunately, the battlespace is a highly complex and unstructured environment to which prescriptive models cannot be easily transferred.

Compatibility studies between the network and its human operators are critical.

Classical approaches to decision making are based on the premise that human decision-making can be modeled on formal processes predicted by theories of probability, rationality and logic. Over the past 15 years however, there has been a recognition that the conditions of the battlefield place limitations on the human decision maker's ability to implement a truly analytic approach. People are likely to deal with multiple pieces of information that may be ambiguous, highly interrelated and potentially obscured or missing.

Studies have shown that even expert decision makers tend to generate only a few potential solutions when solving complex real-world problems. Real world situations often demand very rapid responses and decision makers may have to accept a solution that merely works without considering whether or not a better solution exists. This reality is not incorporated into the rational models.

Unfortunately, researchers have deliberately avoided detailed theorization of this 'non-rational' or intuitive model of decision-making. The lack of modeling is likely to become problematic as NEOps moves forward, because we will not know how people react and make decisions in a large network. Moreover, we need to develop a broader and more sophisticated understanding of what kind of machine/human interface networked systems will require.

Another potential problem with NEOps is its underlying assumption that information sharing creates common situational awareness. While advanced technology allows users to collect information from diverse locations through the use of sensors deployed on both manned and unmanned platforms, it is a stretch to assume that the sharing of this information automatically guarantees a common operating picture. This is especially true if the information is distributed rather than co-located. The assumption that everyone will arrive at the same comprehension and projections based on the same information is often false because each individual interprets information in the context of their own beliefs and mental models.

Related to this is information overload. The emphasis on information 'pull' rather than information 'push' is one way that overload is being addressed. That said, using a 'push' approach, requires the development of systems architecture that enables commanders to determine which elements of incoming information need to be pushed out so that they can pulled. Because different elements will require varying amounts and different information, the filtering of data will become essential in networked operations to ensure that the reliable, and timely information is available to those who need it.

As the CF begins to acquire the technology to make NEOps a reality, it becomes increasingly important that attention be paid to NEOp's human element. Studies in command and control compatibility between human operators and the network will help ensure that the CF are well positioned for the road ahead. FL

Orrick White, Defence Scientist, Defence R&D Canada

Ingar Moen, Director, S&T Policy, Defence R&D Canada.