Defence Innovation Network Grant Scheme: Pilot Project

Support to decision making when integrating Non-Kinetic and Kinetic effects in Ground Warfare

How can decision making can be supported when facing changing circumstances in modern integrated warfare and in such a way that optimum combination of the complex array of systems available is employed? "Optimum" being the application of the integrated systems such that the maximum outcome will be achieved for the tasked number of objectives and for minimum loss to friendly forces.

The support to decision making may be in the form of some low risks decisions being automated and the presentation of options and ancillary information to human decision makers for higher risk decisions.

The initial process definition to achieve a solution was determined as requiring the following functionality:

1. Identification of a changed state and categorisation of the new threats
    - Diagnosis of the changed state from a risk perspective
2. Matching of the characteristics of the new threat to available combinations of systems to have optimum impact.
3. What decisions can be made automatically and for those that cannot how can the system best present options and contextual information to support human decision making?
4. Efficiently and effectively re-tasking resources with the new integrated plan.

OTHER CONSIDERATIONS

The group identified the following additional considerations that need to be taken into account when creating the solution.

- The system may need to be deployed in the field, depending at what level of command the decisions are being made.
- Real scenarios and systems performance characteristics will be required to generate the decision support systems, this may require security clearances and secure data handling.
- The system will need to be a learning system that applies lessons learnt to improve future decision making.
- The decision making will be dependent upon automated calculations of multiple combinations of impact and outcomes
- The human integration with the system will be through a combination of:
    - o Training – Where the automated decision making demonstrates best practices that can applied by the personnel in the future.
    - o During operations when the system supports decision-making.
    - o Post operations when lessons learnt can be applied and the impact of alternate decisions simulated.

Support to decision making when integrating Non-Kinetic and Kinetic effects

"How do we design and develop automated decision support systems capable of providing 'smart' (accurate, detailed and effective) options to the war-fighter for employment of kinetic and non-kinetic systems in response to a situation? Such as system must be able to continuously learn about the adversary, maintain awareness of the desired outcomes of the war-fighter and should be able to act independently in its decision making within specified parameters assigned by the war-fighter."

We are looking for decision support tool that:

- Incorporates data collection (or takes in data from a large number of sources)
- Is aware of the operating environment (air, sea, land, desert, etc.) and the operating context (warfighting, peacekeeping, etc.)
- Is continuously learning from current and past experiences
- Can consider the human in the system (has an appreciation of human factors, psychology, etc.)
- Is an adaptive system (i.e. the weight of factors that influence the decision making process varies according to the context)
- Fuses sensor data
- Addresses the human social dimension (both ourselves and the adversary)
- Considers the effects of kinetic and non-kinetic systems
- Is able to be redesigned/improved according to the outcome provided (resilience and robustness)
- Is able to provide outcomes according to the specifications (quality assurance)
- We need to consider the operator first when designing the system, not the other way around

ADDITIONAL INFORMATION

- There will need to be some sort of baseline collection of data to start the learning process. This could be achieved through a pilot program.
- A pilot program will also serve to test the effectiveness of the system in a controlled environment.
- Security aspects are crucial to protect the way that the data are analysed and options developed.
- The tool needs to consider or 'game' many possible adversary actions and provide a robust recommendation. It also needs to be able to be interrogated and provide a reason for making the recommendations that it does.