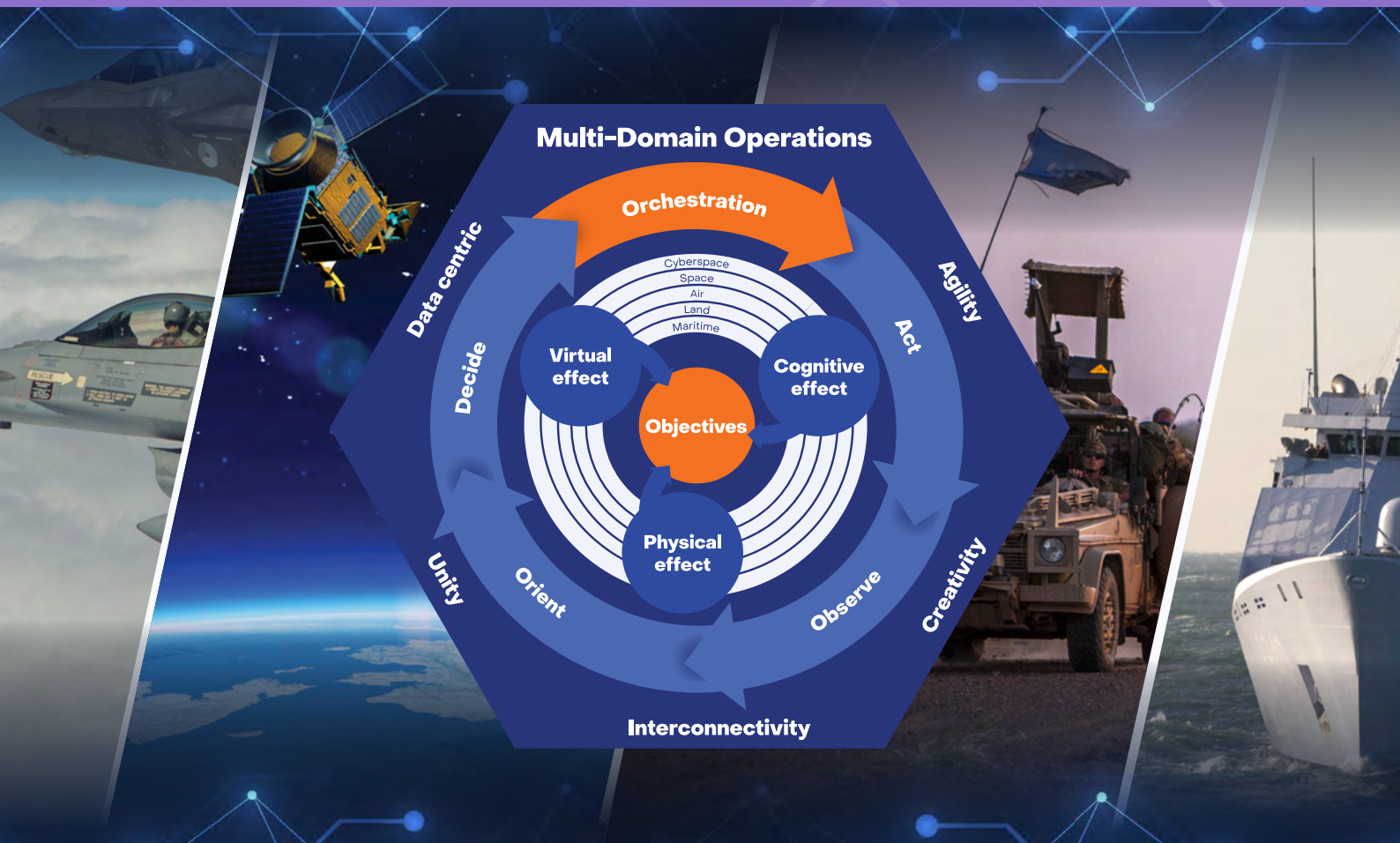


Multi-domain decision-making and training



Near-peer adversaries and rapid and sustained development of intelligent information technologies require Multi-Domain Operations (MDO). The Ministry of Defence wants an information-driven and integrated military approach in the domains of land, sea, air, cyber, and space, synchronized with non-military activities, in order to achieve converging effects in the physical, virtual, and cognitive so as to achieve objectives. The Ministry of Defence requires knowledge on data-driven multi-domain decision-making, support concepts, required competences, and training.

Objectives

By 2035, decision-makers will have a data-driven way of working, and they will be more creative, agile, connected, and integral in orchestrating activities in all domains and achieving effects in the physical, virtual, and cognitive dimensions. Commanders and staffs look, think, and act across domains, anticipate the multi-domain options of opponents, and know how to surprise them and overload them with multiple dilemmas. As orchestration is adapted to changes in the operational environment, they decide earlier, faster, and better thanks to information-driven decision-making processes that use advanced AI techniques. The objective of this programme is to design and validate concepts for complex decision-making for information-driven action in multi-domain operations, including the support and training of the associated individual and team competencies.

Scope of work

In this programme, we work closely with defence experts and answer research questions through a combination of literature research, workshops, observations, interviews, and the design and development of and experimentation with concepts to strengthen multi-domain decision-making and training.

First, we examine the characteristics of decision-making in information-driven multi-domain operations. Based on this, we develop a framework for developing scenarios and vignettes. In collaboration with the Ministry of Defence, we apply this framework to make a number of representative scenarios and vignettes with which concepts for multi-domain decision-making and training can be developed.

To this end, we study which activities and methods are needed in decision-making processes for multi-domain operations. We develop knowledge about factors that influence information management, creativity, agility, interconnectedness, and integrality of decision-making. We apply this knowledge in the development of a concept method for a broadly applicable multi-domain decision-making process. We test the added value and functioning of these methods in experiments.

Information-driven operations require processing of large amounts of data from multiple domains in a short time with the aim of identifying multi-domain courses of action. In this context, we study what information and support needs decision-makers have in multi-domain decision-making. We identify relevant functionalities, data, and AI techniques for the selected scenarios. We test the added value and functioning of a concept that supports continuous and cyclical observation, orientation, decision making, orchestration, and action.

Decision-making in multi-domain operations requires an MDO mindset. It requires thinking in terms of effects on the three dimensions, knowledge about possible synergistic activities in the five domains and ways of orchestrating and synchronizing. To develop this, we identify which knowledge, skills, and attitudes are required and which forms of learning are suitable for developing this. We apply this knowledge in a concept learning solution that we test in an experiment.

In order to empirically test decision-making and training concepts, we identify functional and technical requirements for a test facility.

International cooperation will take place via the NATO Science and Technology Organisation (STO).

Results

This programme results in a database of multi-domain scenarios for research on adaptive and distributed multi-domain decision-making and training. It provides a description of the knowledge, skills, and attitudes required to perform information-driven multi-domain operations. It provides insight into a research environment (MDO lab) with functionalities for empirical testing and validation of decision-making and training concepts. The empirically proven concepts for learning and support will also be made available to the Ministry of Defence.

Programme information

TNO Programme Manager

Drs. C.J.G (Kees) van Dongen
Human Behaviour and Training Department
TNO Defence, Safety & Security

E kees.vandongen@tno.nl
M +31 6 19432224

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