Operational Mission Design & Engineering



MITRE mission engineers developed the Operational Mission Design & Engineering (OMDE) process to define missions, ensure appropriate operational context for mission threads, and provide a methodology for subsequent analytical efforts.

The Value of OMDE

To improve warfighting capabilities, Department of Defense (DoD) acquisition efforts must analyze operations where the missions themselves are the system under study, and science and technology solutions are considered in the larger context of operational application. To accomplish this, DoD sponsors need credible, current, and future state documented mission threads that occur within a well-defined operational context. This allows for better analysis of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) solutions and the ways in which they facilitate mission accomplishment.

The goal of OMDE is to enable this analysis by helping to identify potential improvements in concepts, technologies, and other solutions based on a credible and informed operational environment.

Mission Engineering is the deliberate planning, analyzing, organizing, and integrating of current and emerging operational and system capabilities to achieve desired warfighting mission effects.

Mission Engineering Guide, OUSD R&E

MITRE

Operational Mission Design & Engineering (OMDE)

Mission Characterization

Mission characterization defines the details of a mission, including the scenario where the mission is being executed and variables that impact operational decisions that must take place to complete key tasks.

Scenario design provides the overall context to the Mission Engineering (ME) analysis and can be derived from a Campaign Plan, Defense Planning Guidance, Marine Strategy Framework Directive (MSFD), or family of Joint Operations Concepts. Key aspects of a scenario include mission objectives, threat capabilities, and operational assumptions or constraints.

Wargaming is used by mission engineers to help conceptualize the problem, develop courses of action, define elements of information needed for decisions, discover previously unknown relationships between aspects of a problem, and to understand the problem's dynamics. A well-executed wargame can also help sponsors fully understand the operational problem they are trying to solve.

Mission products are data outputs needed to help fully define an operational context. These may include:

- Red and blue order of battle, force laydowns, and Command and Control (C2) architectures
- Geographic and human terrain analysis
- Commander's intent, mission orders, and courses of action (COAs)
- Intelligence, Surveillance, and Reconnaissance (ISR) collection plans, scheme of fires, and other operational artifacts

Mission Thread Analysis

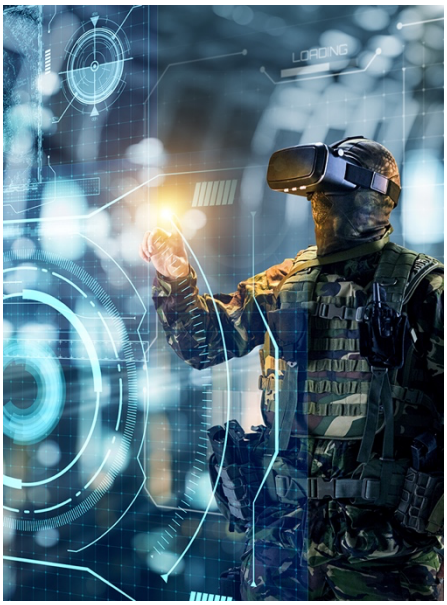
Depending on maturity of concept, mission thread analysis can be both qualitative and quantitative. A qualitative analysis examines how a concept or technology is employed, typically providing more depth than concept documents alone. Quantitative analysis examines how a concept or technology impacts mission accomplishment.

Mission Thread analysis examines emerging concepts, C2 structures, processes, force allocation, and more to evaluate concept maturity and the impacts of technology on the probability of mission success.

Activity flow models are the core element of mission thread analysis. Activity flow models detail the processes required to accomplish a mission based on the operational environment where a mission is being conducted.

Business Process Modeling Notation (BPMN) modeling explores what, who, and how things can be executed. Utilizing iGrafx's discrete event simulation engine, mission threads are analyzed to determine the feasibility of concepts, resource utilization, and an overall comparative analysis within the mission context.

SySML modeling provides system level details on the feasibility of a technology or capability within a mission engineering thread. Cameo models tie system functions to operational activities, interfaces, and data formats, etc. to ensure a system can support operational requirements.





Links

OUSD (R&E) Mission Engineering

https://ac.cto.mil/mission-engineering/

For information about MITRE's mission analysis capabilities, contact omde-list@mitre.org

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