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Operational Analysis Utilizing a Risk Assessment Framework

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NATO AVT 329

NexGen Rotorcraft Impact on Military Operations

- **Objective:** Assess the impact on military operations that might be expected to come from developments in science and technology (S&T) for future rotorcraft to be fielded in the 2035+ timeframe.
- **Product:** Trade space support in development of NATO Next Generation Rotorcraft development program
- **Impact and Exploitation:** Thinking beyond today's helicopters to defeat tomorrow's threats
 - New Aircraft
 - New Doctrine
 - New Tactics

Significant Milestones

- **Multi-National Exercise (MNE) 16-20 September 2019**
 - Develop the Overall Operational Assessment Plan
 - Identification of Supporting Technical and Operational Data
 - OA to be Conducted Relative to Concept of Operations
- **1st Operational Assessment (OA) 23-25 November 2020**
 - Conducted Virtually (Covid travel restrictions)
 - Technology Projections for 2020-2030, 2030-2040, 2040+
 - Generic Operational Data (Mission Vignettes, Operational Conditions, ...)
 - Risk Based Assessment for NATO Rotorcraft in 2035+
- **2nd Operational Assessment (OA) 20-24 June 2022**
 - Conducted at Joint Air Power Competence Centre (JAPCC)
 - Technology Projections for 2020-2030, 2030-2040, 2040+
 - Operational Environment (Endorsed NATO data, geographic locations, threats, ...)
 - Risk Based Assessment for NATO Rotorcraft in 2035+

OA Risk Based Assessment Process

- **Risk Identification:** For each geographic location, risks were identified that may impact future operations in the relevant military environment
- **Risk Assessment:** Each identified risk (based on current helicopters) was evaluated for Probability of Occurrence & Impact
- **Mitigation:** Potential mitigation methods to reduce the effect of the risk through changes to doctrine, procedures or technology
- **Military Worth:** Each identified risk was assessed for its consequence to military operations and the value of mitigation measures

All OA participants were familiar with the risk based assessment process. Utilization as the framework to a qualitative OA was a new application

2nd OA Process

- **1 Common Scenario in 3 different geographic locations:**
 - Geographic Region 1 - Cold
 - Geographic Region 2 – Littoral / Sea
 - Geographic Region 3 – Highly Urban
- **Conduct Risk Assessment for Each Geographic Region**
 - Risk Identification
 - Assessment for 2020-2030, 2030-2040, and 2040+ Threat Environments
 - Pre-set Threat Categories
 - Risk Assessment (Likelihood of Occurrence and Severity if Occurs)
 - Risk Mitigation
 - Military Worth of Mitigation
- **Results (pre-defined templates used)**
 - Summary Risk Matrix
 - Detailed Results Documented for Each Risk

Summary Template - Risk Matrix

Example Geographic Region 1 Cold		Current RISK ASSESSMENT Red (High) Moderate (Yellow) Low (Green)		Operational Assessment Mil Worth of Mitigation - Red (High) Mil Worth of Mitigation - Moderate (Yellow) Mil Worth of Mitigation - Low (Green)	
FOE / Threat Environment	Risks	PROBABILITY	IMPACT	Mitigation	Military Worth of Mitigation - Rationale
Physical Environment - Cold	Example - Risk 1: Battery Life In Freezing Temperatures (Linked to data contained in "Detailed Results" annex)	Red	Yellow	Procedural – Remove and store battery in warm location Engineering – External powered "battery blanket" Technical – New battery design / integration for cold	Operational workaround available and not complicated but with additional logistics footprint.
	Cold: Risks 2, 3, 4, ...	Yellow	Yellow		Rational for Risk Mitigation 2, 3, 4, ...
2020-2030 Threat Environment	Comms and Sensor Denial Risks 1, 2, 3, ...	Red	Yellow		Rational for Risk Mitigation: 1, 2, 3, ...
	Positive ID of Objectives Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Cyber Risks: 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Directed Energy: Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	CBRN: Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Air To Air Threats: Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Air Defense Threat: Unguided Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Air Defense Threat: SHORAD / MANPAD: Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Air Defense Threat: AAA & Hybrid: Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
	Air Defense Threat: IADS Risks 1, 2, 3, ...	Yellow	Yellow	Mitigation to Risks 1, 2, 3, ...	Rational for Risk Mitigation: 1, 2, 3, ...
2030-2040 Threat Environment	Same Categories and Ordering as 2020-2030 Threat Environment	Yellow	Yellow	Mitigation to Risks in 2030-2040 Threat Environment	Rational for Risk Mitigation
2040+ Threat Environment	Same Categories and Ordering as 2020-2030 Threat Environment	Yellow	Yellow	Mitigation to Risks in 2040+ Threat Environment	Rational for Risk Mitigation

Likelihood for the Risk to Occur

Severity if the Risk Occurs

Projected Mitigation of Risk

Identification of Risks due to Physical Environment

What is Value of Mitigation of Risk?

Identification of Risks within 10 Threat Categories

Detailed Results Documented For Each Risk

(with Battery Example)

- **Explanation of Risk:** Battery lives (aircraft, medevac and carried equipment, survival radios etc.) are affected in the freezing temperatures. Cold soaked batteries do not function as intended and require recharge much earlier than high temp environments.
- **Probability of Occurrence:** High – Very likely to encounter extreme cold weather conditions during military operations in cold regions.
- **Impact:** Medium - Inability for current helicopters to quickly respond operationally. There is also an increased maintenance requirement to sustain batteries.
- **Mitigation:** Procedural removal of batteries when not in use and store in a warm location. May also develop AC powered `battery blanket` options. Technical mitigation for improved battery cold weather performance solutions (new design??), new storage methods, and identify more efficient or rapid battery charging/reconditioning.
- **Military Worth:** Low – There are operational workarounds and solutions based on engineering solutions to cold weather storage of batteries. These workarounds enable mission availability in cold environments at a cost of longer operational response time and logistic support needs.

Risk Based Assessment Process

Key Enabler to the OAs

- **Directly related to risk assessment used across nations. OA participants readily able to use framework to guide discussion and document results**
- **Readily adaptable to pre-defined templates for results**
- **Consumers can readily understand the results**

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