NATO Next Generation Rotorcraft Capabilities

Science and Technical Organization (STO) Studies Supporting Rotorcraft

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NATO STO Activities (current)

» AVT 312 (Airworthiness Tools and Processes for Complex Rotorcraft Systems Safety)
  ➢ 2018-2021: Research Task Group (RTG)
  ➢ Overall strategy for certification of complex systems

» AVT 319 (High Speed Rotorcraft Analysis and Evaluation)
  ➢ 2018-2021: Research Task Group (RTG)
  ➢ Effect of increased rotorcraft speed on military capabilities

» AVT 329 (NexGen Rotorcraft Impact on Military Operations)
  ➢ 2019-2022: Long Term Scientific Study (LTSS)
  ➢ Impact on military operations from developments in S&T for future rotorcraft in the 2035+ timeframe

» Awareness of Other Rotorcraft Related Activities with STO
  ➢ AVT 296 (Rotorcraft Flight Simulation Model Fidelity Improvement and Assessment)
  ➢ AVT 315 (Validation Data for M&S of Shipboard Launch & Recovery of Aircraft)
  ➢ SCI 307 (FAMOS – Framework for Avionics Mission Systems)
  ➢ Other Efforts
### Airworthiness Tools & Processes for Complex Rotorcraft Systems Safety
AVT 312 (RTG)

Certification of complex systems, using current approaches, is challenging because of the increasingly large areas of uncertainty in behavior ranging from the sub-system non-determinism of multicore processors, through intelligent systems to the emergent properties of complex system of systems. Additionally, future systems may include adaptive behaviors that may be impossible to assure at design-time.

#### Objective
Overall strategy for cost effective & more insightful certification of complex systems

- Common problems & certification challenges
- Certification strategy & methodology
- Existing state of art strategy, tools & processes
- Technology investment & development efforts

#### Military Relevance
Airworthiness assessment & qualification of aviation platforms focused on:

- Airworthiness Process
- Standards and Deliverables
- Methods of Compliance and Tools
- Verification, Validation and Analysis

Timeframe: 2019 - 2021
High Speed Rotorcraft Analysis & Evaluation
AVT 319 (RTG)

The military value of speed with associated range, response time and survivability aspects will vary across NATO member nations. Evaluation of high speed rotorcraft is needed to understand the tradespace associated with rotorcraft configured to reach speeds beyond the current fleet of helicopters.

Objective
Evaluate the effect of increased rotorcraft speed on military capabilities

- Tradespace associated with high speed rotorcraft
- Recommended investments to achieve
- Evaluation of flight profiles derived from operational missions

Military Relevance
High speed rotorcraft are a force enabler in future military operations. A faster flight speed directly supports a shorter response time and is a potential enabler for increased maneuverability and operational efficiency

Timeframe: 2019 - 2021

Information with the analysis and modelling capabilities supports an operational assessment of high speed rotorcraft on NATO military missions
## NexGen Rotorcraft Impact on Military Ops AVT 329 (LTSS)

<table>
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<tr>
<th>Objective</th>
<th>Military Relevance</th>
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<tr>
<td>Assess the impact on military operations that might be expected to come from developments in science and technology (S&amp;T) for future rotorcraft to be fielded in the 2035+ timeframe.</td>
<td>How emerging technologies, systems and methods may affect tactical concepts and doctrines. Reciprocally, recommendations could be provided on how the evolution of the military doctrine should influence the Science and Technology priorities.</td>
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<td>• Trade space for next generation rotorcraft operational capability vs technology, financial and schedule information</td>
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<td>• inform nations on participation within a NATO rotorcraft collaboration effort</td>
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Trade space support in development of NATO System of Interest (SOI) for Next Generation Rotorcraft development program

Thinking beyond today’s helicopters to defeat tomorrow’s threats

• New aircraft
• New doctrine
• New tactics

AVT 329 – NexGen Rotorcraft Impact on Military Ops

- **Direct Support to Project Next Generation RotorCraft (NGRC)**
  - Analysis of Alternatives for draft NATO System of Interest (SOI)
  - Product - Tradespace of Enhanced Technology vs Operational Capability to include financial implications and potential delivery schedule

- **Synergy of NATO STO activities related to rotorcraft**
  - AVT-312 Airworthiness Tools & Processes for Complex RC Systems Safety
  - AVT-319 High Speed Rotorcraft Analysis & Evaluation
  - Other STO activities

- **Awareness of Rotorcraft Related NATO Armaments and Military Committee Activities with STO**
Approach

**Capability Shortfalls**
- Stakeholder Needs

**Requirements**
- System Requirements / Constraints

**Concept Solution**
- Draft System of Interest (SOI)

**Multi-National Exercise**
- Plan* for Trade Space Analysis
  - *Plan Elements to Include: Assumptions, Scope, Inputs Needed, Analysis Process, Outputs Needed, Personnel and Resources

**Trade Space Analysis**
- Operational Capability vs Technical, Financial, Schedule

**Iterative Development**

**Collaboration by Participating Nations On Next Generation Rotorcraft**

**Draft SOI**
- **Draft ToR, SOW, MOU**

- **Detailed SOI** with Systems Specification, Logistics Plan, Cost Estimation, ....

- **ToR** Terms of Reference
- **SOW** Statement of Work
- **MOU** Memorandum of Understanding

AVT 329