International forum

Towards new European military helicopter programmes

15 June 2022

- Proceedings -

EUROSATORY

Paris
FRANCE

AIRBUS

COGES EVENTS

GICAT

LEONARDO

SAFRAN

CONTENTS

Welcome address

Michel WACHENHEIM

President of the Air and Space Academy (AAE), former representative of France at ICAO

Biography

Michel Wachenheim is a graduate of Ecole Polytechnique in Paris and of the French National Civil Aviation School in Toulouse (ENAC).

He was Director General of Civil Aviation in France from 2002 to 2007, chief of staff of the Minister of Transports from 2007 to 2013, then Ambassador, representing France at ICAO. He chaired the 38th ICAO Assembly in 2013.

Since 1st January 2021, he has been president of the Air and Space Academy.

He is Chevalier de la Légion d'Honneur, Officier de l'Ordre National du Mérite and was awarded the Médaille de l'Aéronautique.

Welcome address

I am glad to welcome you here, on behalf of the Air and Space Academy (Académie de l'air et de l'espace, AAE), of which I am the president. AAE is composed of members who hold or have held significant responsibilities in their respective fields related to aeronautics and space; from a wide variety of backgrounds, engineers, industrialists, researchers, managers, pilots, astronauts, doctors, lawyers, economists, journalists, writers and artists, all work together. There are over 350 members and correspondents of which approximatly one third are « European non French ». They constitute a pool of knowledge unique in Europe aimed at promoting and furthering the development of high quality scientific, technical, cultural and human activities in the fields of Air and Space.

In order to achieve its goals, AAE conducts reflections on general, strategic or topical issues related to Air and Space, at the request of official bodies or on its own initiative. AAE may also occasionally deliver elements of analysis if desired by institutions or industrial groups in their specific areas of interest. Multidisciplinary studies are carried out by AAE's sections and commissions; these highlight essential problems and often lead to the organisation of conferences or forums and to the publication of Dossiers (Files), Opinions and other works.

In our case, a Dossier (no.51) was issued a few months ago, on our own initiative, on the topic « Towards new European military helicopter programmes » and, as the comments received were widely positive, AAE decided to organise a one-day forum, which, thanks to GICAT, could take place here during Eurosatory.

This forum was prepared by a small group of AAE European members (two of whom were German, one Italian and one English) under the responsability of Bernard Fouques. As you will notice, we tried to have European speakers or speakers representing European organisations, unfortunately without UK representatives!

The topics that will be tackled are the following:

- Session 1 will summarise our Dossier 51: historical background, present situation and what about the future ?
- Session 2 will comment possible evolution of operationnal needs, based on lessons learnt on past experience
- Session 3 will explain Europe capabilities to manage civil aeronautical research and complex military programmes
- Session 4 will present industry point of view

A round table held within Eurosatory context will conclude.

Please, note that for this one-day forum we decided to limit ourselves to « rotorcraft programmes » without looking at their weapons systems or at drones…which would have required a one week-forum !

And now, Bernard Fouques will start session 1.

Chair

Bernard FOUQUES

AAE

(Short biography on following page)

Session 1:

AAE Dossier 51
Summary & recommendations

AAE Dossier 51: Summary & recommendations

Bernard FOUQUES

Former Flight Test V.P. Eurocopter,
AAE member, Director of publication of Dossier 51, Chair of the forum

Biography

A graduate of Polytechnique and Sup'Aéro, Bernard Fouques graduated in the French air force in 1966 as an aircraft pilot and then in the French army aviation (ALAT) in 1969 as a helicopter pilot. Later, in 1983, he was trained as a flight test engineer in Empire Test Pilot School.

From 1968-78 at the Bretigny test centre of DGA, he was responsible of the Gazelle helicopter and later on, head of helicopter testing. From 1979-82, he became deputy technical director at the Istres test centre of DGA. He left DGA as Chief Armament Engineer and joined then Helicopter Division of Aérospatiale (later Eurocopter) and became flight test director in 1986. He retired end 2005 with 3500 flight hours.

In 1991 he was appointed to the Civil aviation flight personnel council; in 1994, he was appointed flight crew inspector in Aérospatiale group and became a member of the GIFAS flight personnel commission. He was also a member of the EPNER conseil de perfectionnement as well as being on the 3AF board of governors.

Bernard Fouques is an Officier of the Légion d'Honneur and of the Ordre National du Mérite, he was also awarded the Médaille de l'Aéronautique. In 1991 Bernard Fouques broke the world speed record (200 kt) on Dauphin helicopter.

Presentation

1-History

The use of helicopters by the armed forces of European countries was the result of US war in Korea, French war in Indochina and Algeria and US war in Vietnam, mostly with US built helicopters.

2-The first wave

In 1967, France and UK signed an agreement to develop and produce three types of helicopters for their forces:

- a tactical transport helicopter, the Puma;
- a light observation helicopter, the Gazelle; and
- a medium multi-purpose helicopter, the Lynx.

The total planned was 800 aircraft, delivered from 1970. A total of more than 4 000 were built, including export and civilian versions and the Super-Puma/Cougar/H225 family. However, these aircraft were not widely included in the inventory of other European armies, equipped with US (or Russian) helicopters…or Alouette.

3-The second wave

In 1975, Germany, France and UK signed an agreement for three new programmes:

- Germany would be responsible for the armed helicopter (anti-tank), which became the Tiger, in a German-French framework, then OCCAR, later extended to Spain;
- France would be responsible for the medium helicopter, which became the NH90, a heavy helicopter, in a NATO framework with French preponderance, participation by Germany, Italy, the Netherlands and later Portugal;
- The United Kingdom would be responsible for the heavy helicopter, which became the EH101 Merlin, a heavy to very heavy helicopter, in a British and then Italian-English framework.

The planned total was a thousand aircraft, almost been reached to date, but with a smaller number of anti-tank Tigers, due to the collapse of the Eastern bloc. The first deliveries of this second wave date from around 2000.

4-The present situation

There are about 2,500 helicopters in the European armies, the largest users being France and UK (>400), Italy (>300), Germany, Poland and Greece (>200); many types/versions of aircraft are in service, of US, European or Russian origin.

It should be noted that, due to the great versatility of helicopters, it is usual to classify most of them by maximum take-off weight, rather than by mission; the biggest (and most expensive) are very heavy helicopters (over 13 t), heavy helicopters (8 to 13 t) and specialised armed helicopters.

5-Questions for the short term

As far as light and medium helicopters, their supply is not really under threat thanks to the military versions of civilian platforms built by the two European industries Airbus and Leonardo .

Unlike France, the question of very heavy helicopters does not arise, nor does the question of specialised armed helicopters, because of the forthcoming upgrading of the aircraft in service.

6-The long-term need

Serious consideration must be given to the replacement of the fleets that will gradually reach the end of their lives before 2040. Of course, for all these programmes, collective funding is a realistic option. Given the difficulty and length of the process of European convergence on armament programmes, it would be important for the major European countries, including UK, to take rapid initiatives in this direction.

It goes without saying that this process will have to involve the staffs; in fact, in addition to the choice of technical and operational performance criteria, it seems imperative that a harmonisation of employment doctrines be carried out beforehand. The arrival of VTOL UAV programmes, in particular for the navy or for air to ground attack, must also be taken into account.

These considerations should apply first to a heavy helicopter programme, whose present situation is not clear.

- End 2020, five countries (Germany, the United Kingdom, Italy, Greece, and France) signed a letter of intent for a NATO «Next Generation Rotorcraft Capabilities» (NGRC).
- Early 2021, Airbus and Leonardo proposed to the European Defence Fund a European Next Generation Rotorcraft (ENGRC).
- In addition, UK and Italy may participate to the US Joint Multirole Rotorcraft/Future Vertical Lift programme.

The above considerations should also be applied, still with a view to European strategic independence, to longer term programmes for very heavy and specialised armed helicopters.

7- Conclusion

If we Europeans wish to promote Europe's independence and sovereignty vis-à-vis American competition, it is high time to ask ourselves the question of launching new cooperative programmes, for which we know that the gestation cycle can take up to twenty years.

As with the two previous «waves», an intergovernmental agreement sharing responsibilities would probably be welcome, not only for heavy, but also for longer term very heavy and specialised armed helicopters.

Chair

Andrew WARNER

AAE

Andrew Warner graduated in engineering at Oxford University before joining the British Army Air Corps. He was trained at the Empire Test Pilots School and then worked on electro-optics development at the Royal Aircraft Establishment. He joined MBB as program test pilot for the Tiger attack helicopter. He conducted the first flight and subsequent envelope expansion including the first aerobatics, the first flights of three prototypes and the first weapon release of HOT, rockets, canon, Hellfire and Spike. Andrew was Chief Test Pilot of Airbus Helicopters, responsible for worldwide operations before retiring to Bavaria and Provence. He has flown 70 types of aircraft, was awarded the Derry and Richards Memorial Medal and the Alan Marsh Medal and is Fellow of the Académie de l'Air et de l'Espace, the Royal Aeronautical Society and the Society of Experimental Test Pilots.

Session 2:
Evolution of operational needs

Session 2:
Evolution of operational needs

Major General (ret) Reinhard WOLSKI

Biography

Reinhard Wolski is a retired Major General of the German Armed Forces. He was most recently the head of the Army Development Office. He trained as a paratrooper, then switched to the Army Aviation Corps. In 1977, he graduated from the Bundeswehr University in Munich with a degree in engineering. He trained as a helicopter pilot and served as a squadron captain and later as Regiment commander. In 2003, Wolski completed a foreign assignment as part of SFOR in Bosnia and Herzegovina, where he served as Chief of Operations in Sarajevo. He acted as Deputy Chief of Staff Operations in Priština at the headquarters of KFOR in Kosovo, under both French and Italian command. In 2009, Wolski took over the post of commander of the Army Aviation School in Bückeburg, and at the same time became Army Aviation General. This was followed by the assignment as Deputy Chief of Staff (DCOS) Resources at HQ ISAF - Kabul (Afghanistan). General Wolski was later commander of the NATO Joint Warfare Center in Stavanger (Norway).

General Wolski was unable to attend the Forum for health reasons but a presentation based on an interview with him was given on his behalf.

Political background

NATO Article 5 (attack against one = attack against all) will steer capability development and procurement and remains the governing factor.

Non-Article 5 operations will be conducted according to UN/NATO/EU requests and approved by the Bundestag. e.g. Mali, Iraq, Afghanistan, Syria.

German defence spending

1963: 4.9% GDP (Gross Domestic Product)

2015: 1.3% GDP = 38 Bn€

2021: 1.4% GDP = 47 Bn€

Since Ukraine, 2022: Target 2%

GDP = 75 Bn€ plus Special Budget of 100 Bn€

Heavy, tactical transport and assault helicopters

NH90 will be upgraded to cover interim requirements.

Heavy and medium lift transport helicopters are not the focus of attention at the moment.

New developments in US and Europe are being monitored.

A successor to the NH90 could be high speed but depending on what is on offer on the market.

Very heavy helicopters

Germany has 67 x CH53 which need to be replaced.

The proposed Future (Heavy) Transport Helicopter never came to fruition.

The purchase of 60 x CH47F Chinook out of the 100Bn€ supplementary budget has effectively closed procurement in that segment.

Attack helicopters

Attack Helicopters must be capable not only of support roles but also of deep penetration.

If the fixed-wing Future Combat Air System (FCAS) requires manned aircraft, then so do attack helicopters.

This is a very demanding role in terms of development effort.

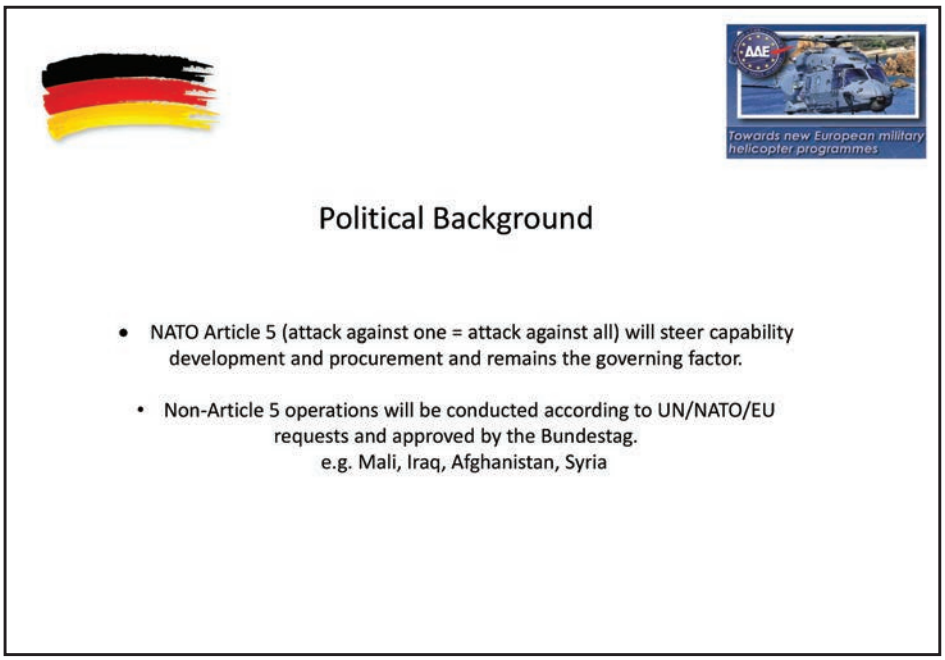
UAVs alone cannot fulfil this role.

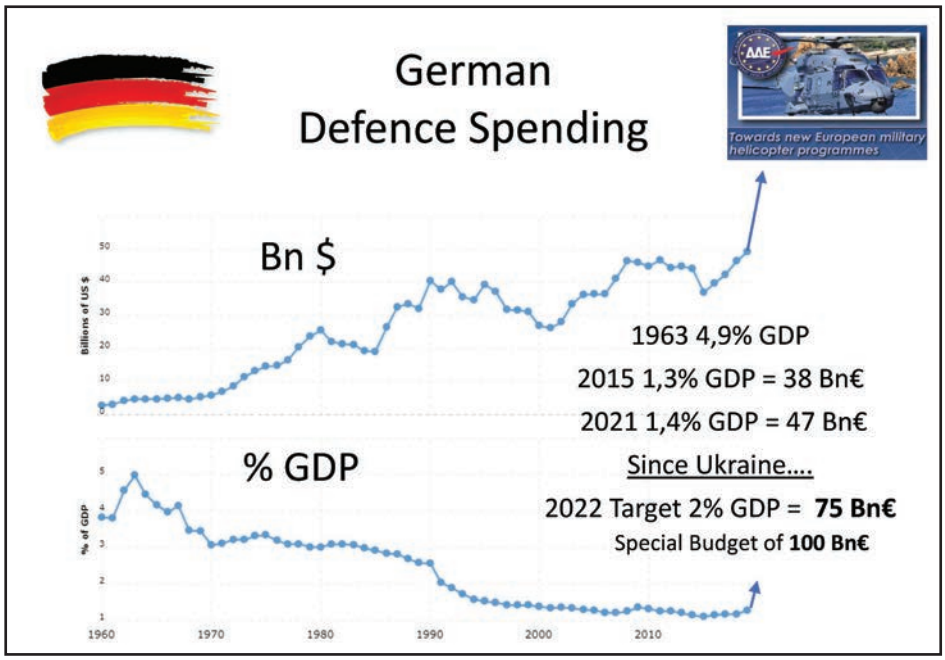
“The more complex, the more manned, the more dangerous, the more unmanned”.

Tiger will be retired from service around 2030

Armed helicopters such as the AH145M will fill the gap (over friendly territory)

Another possibility is Cobra-Z, AH-64 for the “hard end”, or waiting for the next generation.




German
Defence Spending
Towards new European military helicopter programmes
Bn $
Billions of US $
% GDP
% of GDP
1963 4,9% GDP
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Since Ukraine....
2022 Target 2% GDP = 75 Bn€
Special Budget of 100 Bn€
1960
1970
1980
1990
2000
2010


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Attack Helicopters

- Attack Helicopters must be capable not only of support roles but also of deep penetration
- If the fixed-wing Future Combat Air System (FCAS) requires manned aircraft, then so do attack helicopters.
- This is a very demanding role in terms of development effort.
- UAVs alone cannot fulfil this role.
  - "The more complex, the more manned,....
  - the more dangerous, the more unmanned".

Attack Helicopters

- Tiger will be retired from service around 2030
- Armed helicopters such as the AH145M will fill the gap (over friendly territory)
- Another possibility is Cobra-Z, AH-64 for the "hard end", or waiting for the next generation.

Evolution of operational needs

Lt. Gen (ret) Danilo ERRICO

Biography

Lieutenant General (ret.) Danilo Errico joined the Military Academy in 1973.

At the beginning of his career he served as Platoon Leader and Company Commander (26th Battalion of the «Garibaldi» Brigade/»Ariete» Armored Division) in the north-east of Italy.

In 1983, he became Military Helicopter Pilot and assigned to the 1st Antares Army Aviation Regiment and from 1986 to 1991, he was Flight instructor at the Italian Army Aviation Training Centre.

Command positions:

1993–1994 67th bersaglieri mechanized battalion ("Garibaldi" Brigade);

1997-2000 7th Attack Helicopter Regiment «Vega» ("Friuli" Air Mobile Brigade);

2003-2004 «Pinerolo» Armored Brigade;

2004-2005 Army Aviation Training Centre;

2012-2013 Commander 1st Italian Corp.

Staff positions:

1992-1993 Army General Staff - Chief Army Aviation section;

2000-2003 Italian Permanent Delegation to NATO - Chief of the Force Planning and in that position he represented Italy in the Defense Review Committee (DRC) and in the PfP PARP Committee;

2007-2008 Chief Cabinet of the Italian Chief of Defense;

2008-2012 Army General Staff - Head of the Deployment of Forces / Army Operational Command;

2012-2015 Deputy Chief of the Defense Staff.

On February 2015 he was appointed Chief of Staff of the Italian Army serving until February 2018, when he retired.

Operations:

1997 - UN Peacekeeping Operation «Alba» in Albania;

2004 - KFOR Multinational Brigade South West in Kosovo (Prizren)

2006 - ISAF Regional Commander West in HERAT.

Education:

1991-1992, Italian War College.

Two degrees, one in Strategy Sciences and one in International and Diplomatic Sciences.

Major decorations include:

- Air Force Military Gold Medal for Long Air Navigation (20 years);
- The United States of America Legion of Merit degree of Commander;
- Grand Cross to the Military Merit of the Spanish Army with White Decoration;
- Gold Cross to the Merit of the German Armed Forces;
- Chevalier de la Légion d'Honneur;
- Legionnaire of Honor of the Spanish Legion.

Summary

1. To start it is important to state the factors that define and condition the (cyclical) process for the identification of the necessary operational requirements. In particular, we must assess the evolution of the threat, identify the operational capabilities gaps and meet the new needs.

2. It will then taken as an example the successful story of the Italian A129 “Mangusta”. The A 129 started as an antitank helicopter in the 80s and according to the evolution of the operational environment, after many versions and improvements based on our experience on operations has led us today to the brand new 249 NEES (Nuevo Elicottero da Esplorazione e Scorta - New Scout and Escort Helicopter).

3. Afterword, it is necessary to deal with the requirements in multi-domain operations, identifying new capacitive gaps needed to meet new requirements. They must be considered common to all segments and should allow to: operate in a degraded environment, penetrate anti-access/area denial, operate with degraded communication and navigation, carry out long range redeployments in limited times, plug in to an extended network, mission survivability, modularity, payload, manned/unmanned team integration, performance.

4. Performance factors (speed, endurance/range, and payload) are features that must find the right compromise among them, so that trying to privilege one does not lead to an excessive imbalance on the other. I believe it is also necessary to achieve operational balance between the various segments and operational performance alignment, considering for the light and specialized segment the relevance of endurance for the particular type of employment.

5. Manned-unmanned teaming will play a key role since it will be able to enhance the mission effectiveness in the multi domain environment. In fact, the combined employment of these two platforms will facilitate the decision-making process, thanks to the capability of collecting more accurate information, while at the same time increasing the capacity of conducting bold attacks beyond the enemy lines, keeping helicopters far away from dangerous areas and reducing the risks for the pilots.

6. Before concluding, is to be identified the class of helicopters to be replaced, among the four segments of the fleet in service in the Italian Army. The result must derive from an assessment of both the existing helicopters in service (legacy) and the programs already in place or about to start. This would allow to always having in each segment fully operational helicopters (to avoid capacitive gaps it is important to synchronize the phase-out of the legacy and phase-in plan of the new helicopter).

7. In conclusion, the new operational environment with multi-domain operations require helicopter fleet with better performances and well balanced among the different segments. Very important will be the manned-unmanned teaming to integrate the capabilities of both assets and enhance the mission effectiveness. Furthermore, it is necessary to identify which class of helicopter to replace based on the already existing programs.

Towards New European Military Helicopter Programs

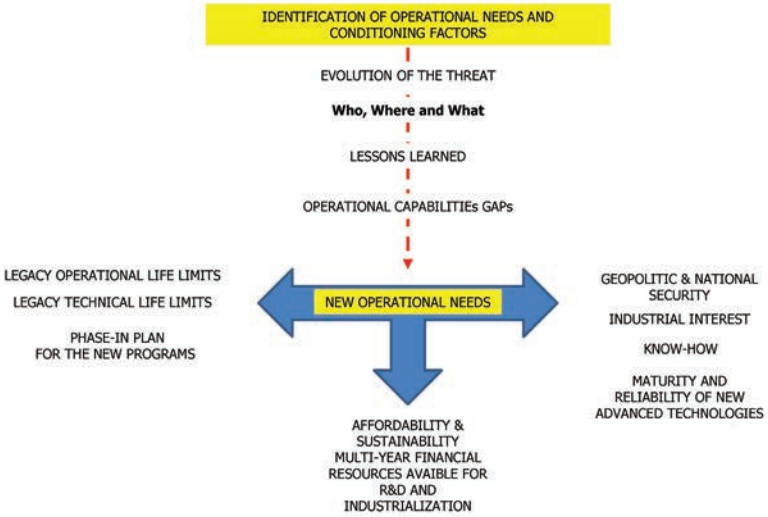
Panel: Evolution of Future Operational Needs

Paris, 15th June 2022

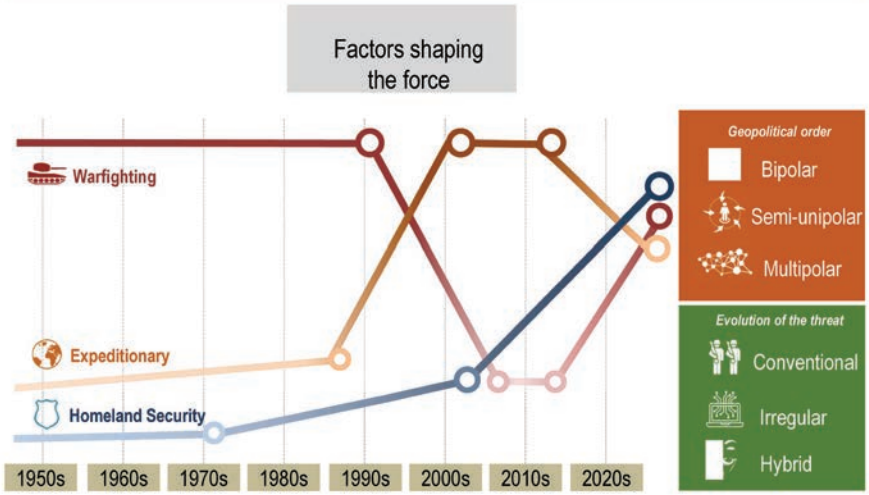


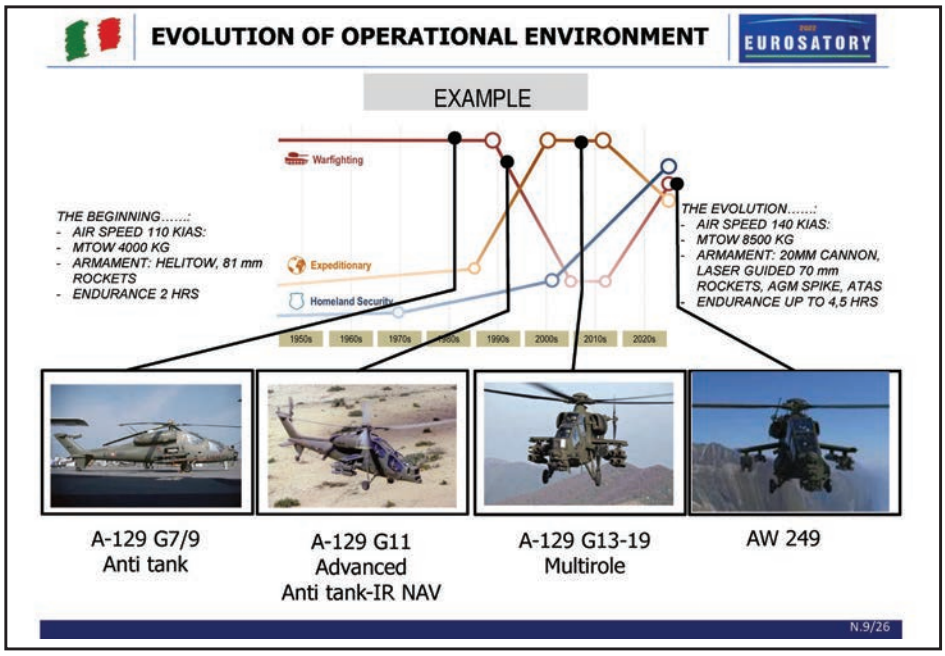
LTG ITA (ret.) Danilo ERRICO

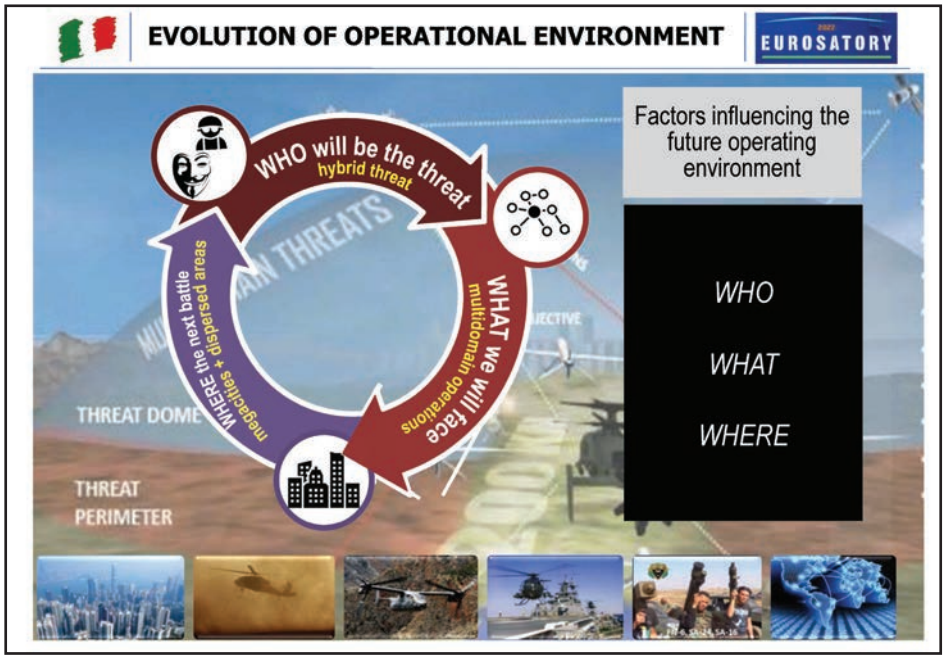
EVOLUTION OF OPERATIONAL ENVIRONMENT

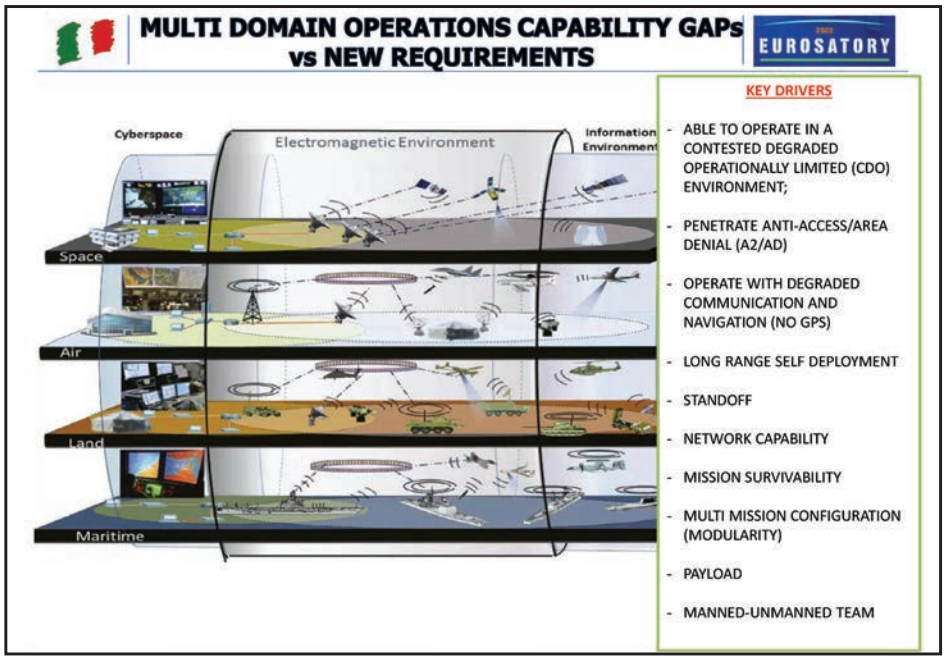


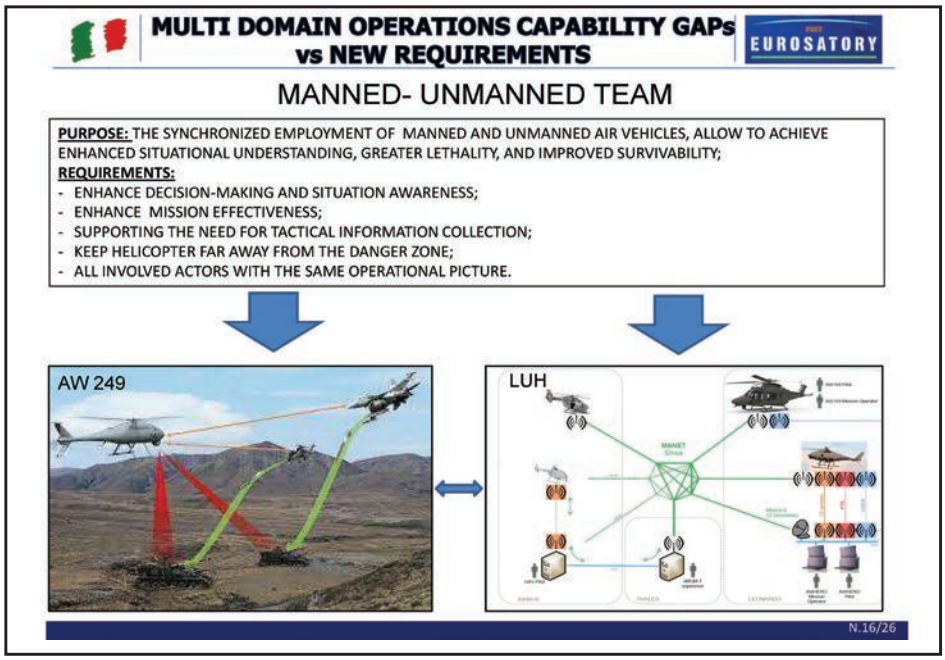
EVOLUTION OF OPERATIONAL ENVIRONMENT

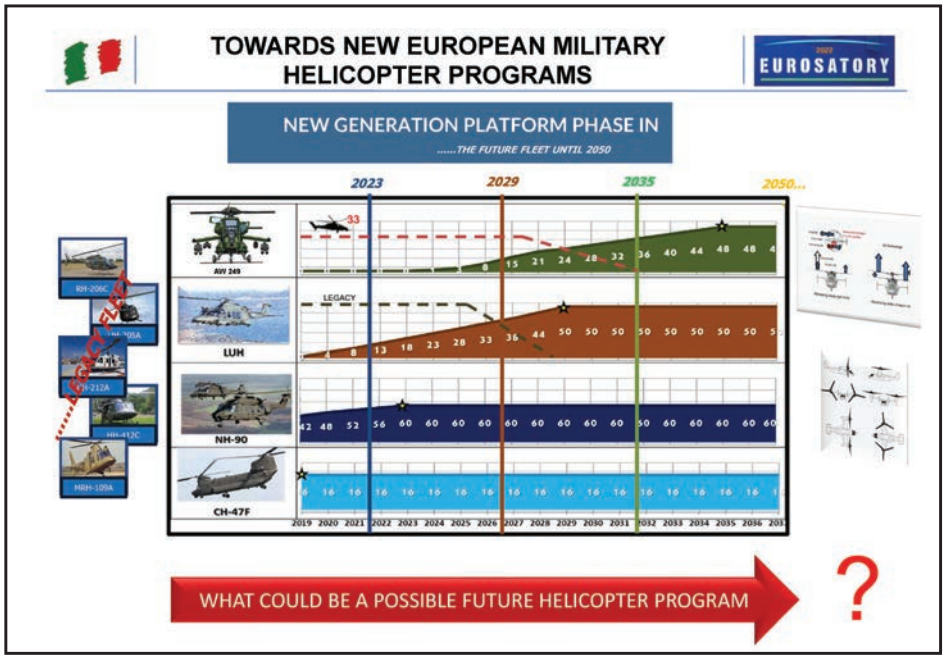


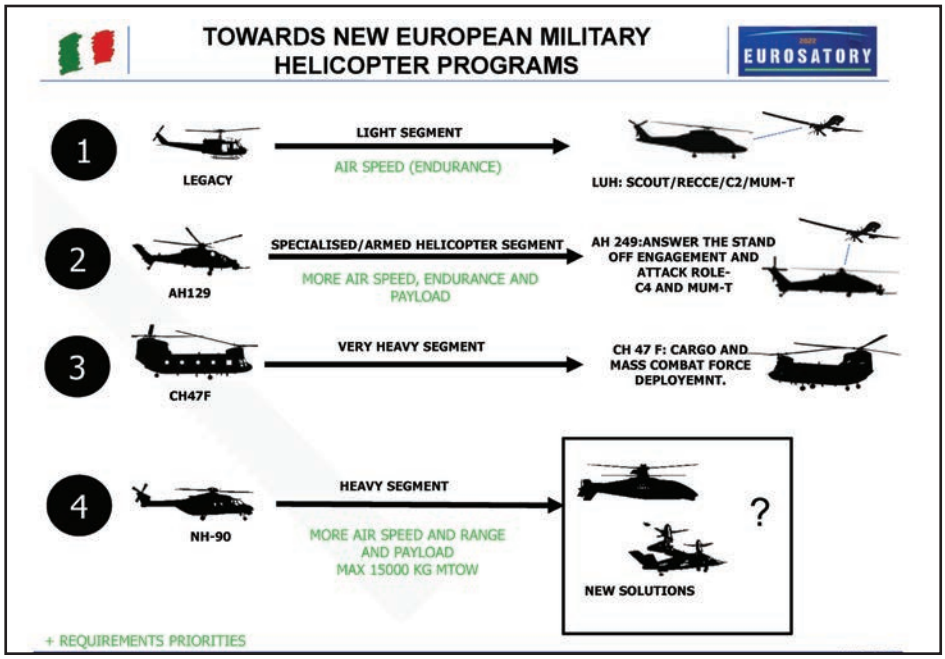

EVOLUTION OF OPERATIONAL ENVIRONMENT
EUROSATORY
EXAMPLE
Warfighting
Expeditionary
Homeland Security
1950s
1960s
1970s
1990s
2000s
2010s
2020s
THE BEGINNING……:
- AIR SPEED 110 KIAS:
- MTOW 4000 KG
- ARMAMENT: HELITOW, 81 mm ROCKETS
- ENDURANCE 2 HRS
THE EVOLUTION……:
- AIR SPEED 140 KIAS:
- MTOW 8500 KG
- ARMAMENT: 20MM CANNON, LASER GUIDED 70 mm ROCKETS, AGM SPIKE, ATAS
- ENDURANCE UP TO 4,5 HRS
A-129 G7/9
Anti tank
A-129 G11
Advanced
Anti tank-IR NAV
A-129 G13-19
Multirole
AW 249
N.9/26


EVOLUTION OF OPERATIONAL ENVIRONMENT
EUROSATORY
WHO will be the threat
hybrid threat
WHAT we will face
multidomain operations
WHERE the next battle
megacities + dispersed areas
Factors influencing the future operating environment
WHO
WHAT
WHERE
THREAT DOME
THREAT PERIMETER

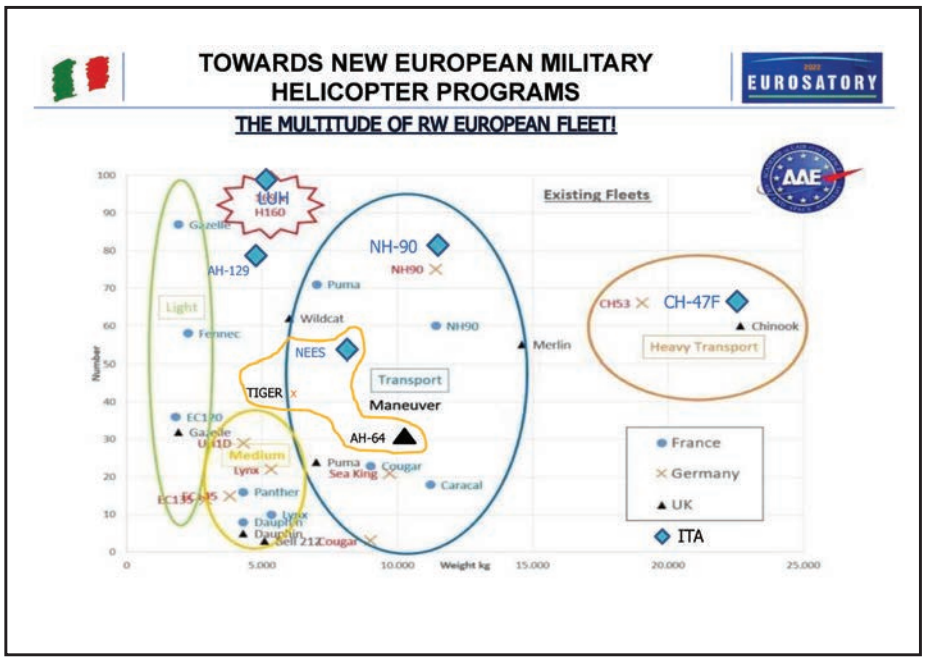

MULTI DOMAIN OPERATIONS CAPABILITY GAPs vs NEW REQUIREMENTS
EUROSATORY
Cyberspace
Electromagnetic Environment
Information Environment
Space
Air
Land
Maritime
KEY DRIVERS
- ABLE TO OPERATE IN A CONTESTED DEGRADED OPERATIONALLY LIMITED (CDO) ENVIRONMENT;
- PENETRATE ANTI-ACCESS/AREA DENIAL (A2/AD)
- OPERATE WITH DEGRADED COMMUNICATION AND NAVIGATION (NO GPS)
- LONG RANGE SELF DEPLOYMENT
- STANDOFF
- NETWORK CAPABILITY
- MISSION SURVIVABILITY
- MULTI MISSION CONFIGURATION (MODULARITY)
- PAYLOAD
- MANNED-UNMANNED TEAM

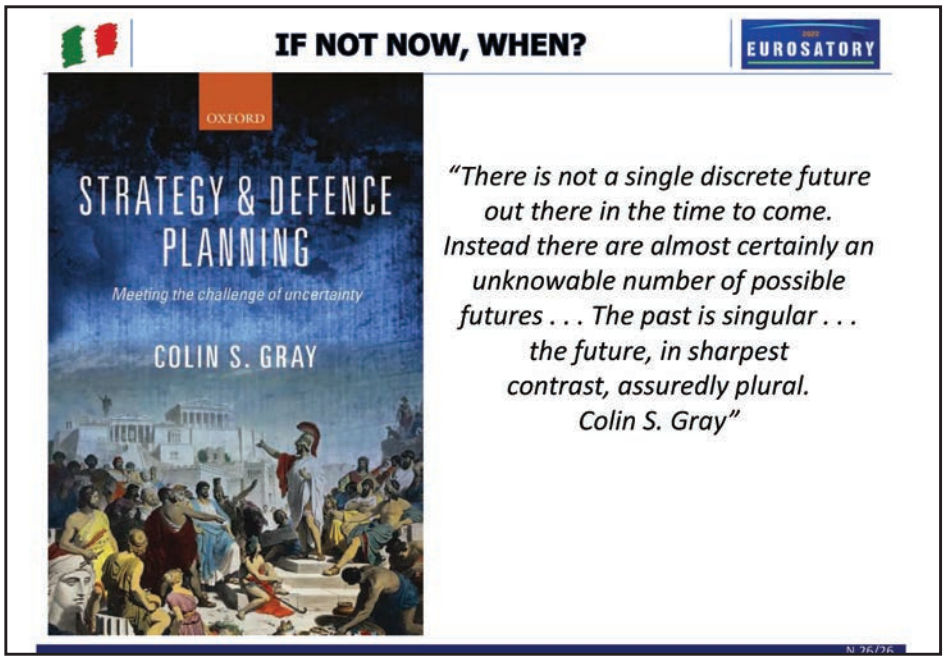

MULTI DOMAIN OPERATIONS CAPABILITY GAPs vs NEW REQUIREMENTS
EUROSATORY
MANNED- UNMANNED TEAM
PURPOSE: THE SYNCHRONIZED EMPLOYMENT OF MANNED AND UNMANNED AIR VEHICLES, ALLOW TO ACHIEVE ENHANCED SITUATIONAL UNDERSTANDING, GREATER LETHALITY, AND IMPROVED SURVIVABILITY;
REQUIREMENTS:
- ENHANCE DECISION-MAKING AND SITUATION AWARENESS;
- ENHANCE MISSION EFFECTIVENESS;
- SUPPORTING THE NEED FOR TACTICAL INFORMATION COLLECTION;
- KEEP HELICOPTER FAR AWAY FROM THE DANGER ZONE;
- ALL INVOLVED ACTORS WITH THE SAME OPERATIONAL PICTURE.
AW 249
LUH
N.16/26


TOWARDS NEW EUROPEAN MILITARY HELICOPTER PROGRAMS
EUROSATORY
NEW GENERATION PLATFORM PHASE IN
.....THE FUTURE FLEET UNTIL 2050
2023
2029
2035
2050...
AW 249
LEGACY
LUH
NH-90
CH-47F
WHAT COULD BE A POSSIBLE FUTURE HELICOPTER PROGRAM
?


TOWARDS NEW EUROPEAN MILITARY HELICOPTER PROGRAMS
EUROSATORY
1
LEGACY
LIGHT SEGMENT
AIR SPEED (ENDURANCE)
LUH: SCOUT/RECCE/C2/MUM-T
2
AH129
SPECIALISED/ARMED HELICOPTER SEGMENT
MORE AIR SPEED, ENDURANCE AND PAYLOAD
AH 249:ANSWER THE STAND OFF ENGAGEMENT AND ATTACK ROLE- C4 AND MUM-T
3
CH47F
VERY HEAVY SEGMENT
CH 47 F: CARGO AND MASS COMBAT FORCE DEPLOYEMNT.
4
NH-90
HEAVY SEGMENT
MORE AIR SPEED AND RANGE AND PAYLOAD
MAX 15000 KG MTOW
?
NEW SOLUTIONS
+ REQUIREMENTS PRIORITIES


TOWARDS NEW EUROPEAN MILITARY HELICOPTER PROGRAMS
EUROSATORY
MAX 14 SOLDIERS LIGHT EQUIPPED
ENDURANCE
MORE THAN 900KM
AIRSPEED (VNE)
165KIAS
CRUISE
140 KIAS
MAX ALTITUDE
20.000FT
WEIGHT (MTOW)
10.600KG
CARGO HOOK
4.000KG (MAX LOAD)
HOIST CAPABILITY
270KG (MAX LOAD)


TOWARDS NEW EUROPEAN MILITARY HELICOPTER PROGRAMS
EUROSATORY
THE MULTITUDE OF RW EUROPEAN FLEET!
AAE
Existing Fleets
UH H160
AH-129
NH-90
NH90
Puma
Wildcat
NH90
Merlin
NEES
Transport
Maneuver
TIGER
AH-64
Light
Fennec
Medium
Lynx
Panther
Puma
Sea King
Cougar
Caracal
Dauphin
Sell 212
CH53
CH-47F
Chinook
Heavy Transport
France
Germany
UK
ITA
Number
Weight kg
0
5.000
10.000
15.000
20.000
25.000


IF NOT NOW, WHEN?
EUROSATORY
OXFORD
STRATEGY & DEFENCE PLANNING
Meeting the challenge of uncertainty
COLIN S. GRAY
"There is not a single discrete future out there in the time to come. Instead there are almost certainly an unknowable number of possible futures . . . The past is singular . . . the future, in sharpest contrast, assuredly plural.
Colin S. Gray"

Endurance and interoperability

Général (2S) Olivier de la MOTTE

Biography

In 1986, after 5 years in the cavalry, Olivier de la Motte joined the French Army Aviation School to train in piloting and then as a helicopter platoon leader.

In 1991, he took part as a helicopter squadron commander in the Gulf War.

Later, he was assigned for three years in two aeronautical engineering school and obtained a test engineer diploma in 1997.

Between 1998 and 2010, he was postponed to different staffs, in offices in charge of the acquisition of weapon systems, particularly in aeronautics and for the French Army Aviation.

During this period, from 2001 to 2003, he commanded the Army Aviation Test Unit.

In 2010, he was appointed general commanding the French Army Aviation School.

From 2012 to 2016, he was at the at the head of the French Army Aviation (COMALAT).

Now, as a civilian, he is executive officer of OPALE Défense, which manages the support of the headquarter of the Ministry of the Armed Forces in Balard.

Olivier de la Motte is Officier de la Légion d'Honneur, Officier de l'Ordre National du Mérite, recipient of the Médaille de l'aéronautique et of the Croix de guerre TOE.

Summary

Central idea: The helicopter is by nature a carrier in the third dimension "3D", with extraordinary potential for use. An in-depth analysis of its qualities quickly shows that its use is ideal if it is integrated into an overall system with multiple vectors.
To ensure this optimization, a helicopter must master two major capabilities: endurance and interoperability.

What are the basic characteristics of helicopters that define their operational employment?

Hovering is the basic feature of this aircraft. That goes without saying. In fact, the name «helicopter» is so associated with this type of flight. No doubt, it is useful to remember this, because this flight is synonymous with extraordinary ease of use. Take-off directly vertically from the ground, in a controlled manner, is the ideal posture, the dream of any individual who wants to fly.

The first image that comes to mind when thinking of a flying object is of overcoming obstacles, so its maneuverability. When we think of helicopter, we imagine it «flying as we want, at the speed we want, at the height we want and stopping where we want on the course». The key word is versatility.

Talk about its qualities, we can mention its flexibility of use, which quickly leads to the notions of Multi-role, multi-mission. It is really suitable for the military diet and the civilian world. Basic skills are the same in both environments. Only the conditions of employment differ.

Additionally, the helicopter is deployed in three military environments: in land environment, in air environment, in maritime environment.

Of course, there may be some limitations related to flight endurance, heavy maintenance, or logistical needs. Thus, its operation requires highly qualified and trained personnel. In general, the third dimension is demanding. It is not natural for humans and therefore 3D is qualified as a hostile environment.

So, what are the criteria that I would retain as a priority?

Deep operations are ideal to answer the question about the qualities necessary for helicopters. These missions require the mastery of many skills. They are typical of special forces employment. They highlight the specific qualities of the helicopter.

These operations require the ability to cross very difficult and hostile access areas. They cause the surprise effect, with strong consequences.

To be engaged in this type of mission, the helicopter must have two major qualities, endurance (long range capability) and interoperability, for both light and heavy helicopters, as well as combat helicopters.

Endurance gives the helicopter the ability to deploy at long range and then act. It should not be obtained by increasing the weight. The main thing is the payload. In recent years, the ability to fly for a long time, at altitude, or even fast has resulted in an increase in mass, and so reductions in carrying capacity or maneuverability.

Interoperability is essential today for employment. No question for a helicopter to be deployed alone. The complementarity between the types of helicopters, heavy, armed or light, is essential. Also, the relationship with the other vectors in the third dimension is not a competition.

This requires flying platforms that are very stable, maneuverable and easy to hide in the terrain. The helicopter is expected for its intrinsic flight qualities.

The helicopter constitutes an inter-environment system. It is often said that it is the prerogative of countries mastering a technology with high added value. With the helicopter an army enters the big leagues.

Notes on Session 2: Evolution of operational needs

Key messages

- Interoperability: All military helicopters must be capable of being fully integrated into a highly complex multiplayer battlefield environment.
- Reaction to change: Military helicopters must be capable of rapidly adapting to dramatically changing threats and scenarios. Recent history has shown that the military cannot know whether the next area of activity will be warfighting, expeditionary operations, or homeland security.
- Manned / Unmanned operations: Helicopters and drones are complimentary. Both are essential. The balance between them will depend on the environment, the complexity of the task, the danger, and the technology available.
- Very heavy aircraft: No strong requirement for the development of a European very heavy helicopter was expressed.
- High-speed: No strong requirement was expressed for very high-speed rotary wing aircraft. Developments in the USA and in Europe are observed with interest but with little participation at this stage.
- Range endurance and payload: Endurance, that is the ability to loiter in the area of operation, was strongly requested by all parties.
- Cooperative programmes: The military are keen to join cooperative programmes. They await political and industrial cooperation.

Detailed discussion

Interoperability

Interoperability and integration into a complex battlefield were at the forefront of the presenters' minds. It is essential that future helicopters are equipped to be able to be part of a complex multi-player battlefield. There is no question of any type of helicopter being diployed alone. It always participates as part of a multi-party system. The influx of many actors into the third dimension such as aircraft drones, artillery shells must not turn into a competition. The interoperability between them is a multiplier of efficiency. This requirement applies to all categories of helicopter: light, transport, and combat. The crew need an aircraft which is manoeuvrable, easy to operate, and which gives them the information and situational awareness they need to respond spontaneously to a rapidly changing battlefield situation. A high level of connectivity which enables the treatment of information in real time and the integration into the battlefield information systems are essential.

Reaction to change

"The past is singular; the future is plural". Emerging threats and emerging technologies change very quickly in comparison to the 20-year cycle for the introduction of a new programme. The rapid and repeated changes of emphasis for the role of military helicopters was underlined. The emphasis between the roles of warfighting, expeditionary campaigns, and homeland security changes very rapidly and very unpredictably. The examples given were that of the A129 and the Tiger which have changed their role and configuration dramatically over the past 20 years. The recent change from Afghanistan to Ukraine is a classic example which demonstrates the essential need for versatility. A modular design structure would allow a common core aircraft with additional modules to adapt to the inevitable individual requirements of different nations. Modularity also is essential for avoiding obsolescence. The general tendency is for vehicle to last much longer than the avionics and weapons systems. The importance of a programmed phasing in and phasing out of new aircraft was underlined. The aim being to ensure a complete homogeneous fleet during the transition from one generation to the next avoiding lack of certain capabilities during the transition.

Manned / Unmanned

The general opinion seemed to be that unmanned aerial vehicles would play an increasing role in the future as the technology matures but would not be able to replace the flexibility offered by a manned attack helicopter in a fluid battlefield environment. General Wolski quoted "the more complex the more manned, the more dangerous the more unmanned". General de la Motte stated there is "no operation without a helicopter and no operation without a drone". The drone will

not replace the helicopter but rather it is a question of balance and tactical choice. For a well-controlled action such as intelligence at very long range the drone is very suitable. For a long-distance operation requiring lots of players, troop drops and recovery where we have to adapt the modes of action the helicopter is largely preferred. The two are complementary. What is absolutely essential is a system which permits perfect cooperation between manned and unmanned aircraft on the battlefield and therefore enhances their effectiveness and enables the helicopters to keep away from danger zones.

Very heavy aircraft

The recent order for 60 CH47 for the German army and the existing Chinook and CH53 fleets throughout Europe have led to a diminished requirement for a new very heavy aircraft programme. The cancellation of the Germano-French future heavy transport helicopter project was also an indicator that the immense investment necessary to develop an aircraft to beat the CH47 and the CH53 makes the probability of a programme to produce a European aircraft in this category unlikely.

High speed aircraft

The presenters did not emphasise a need for high-speed aircraft except in the heavy transport segment 8 - 13 tonnes where the possibility of using one of the configurations currently under development was suggested. The military representatives were looking with great interest in the direction of the configurations such as Defiant (Sikorsky-Bell) and Valor (Bell) which are already flying in the USA. They were aware of the developments running under the “Clean Sky” program, i.e. the NGCTR tilt rotor concept under development by Leonardo and the Racer under development by Airbus, but the military versions of these two aircraft were not noticeable among their list of possible future aircraft. The presenters emphasised a need examine and develop military variants of these two concepts.

An important aspect is a homogeneity of speed between the different aircraft within the fleet. In order to be able to operate together they should be able to fly at least at similar speeds.

Range, Endurance and Payload

A maximum of range is highly desirable but in the particular case of the specialised attack helicopters endurance is equally important. It is important for attack helicopters to be able to loiter in the area of operation for extended periods. The mission never consists of “arrive, attack, depart”, but rather being available within the area of operation for as long as possible. The operators are unwilling to sacrifice range or endurance to the benefit of increased speed. Increases in range and endurance should not be allowed to reduce the manoeuvrability which is the helicopter’s primary advantage.

Cooperative programmes

All the presenters representing the military emphasised that they were prepared to adapt their methodology and tactical doctrine to ensure commonality. This would be essential to enable working together on new military helicopter. Recent operations have involved intense cooperation between the forces of many different nations, and they are now used to adapting their modus operandi to each new team configuration and scenario. If new cooperative programmes are to happen, then the same level of cooperation and compromise must be attained amongst politicians and industry.

Andrew WARNER, Chair of Session 2

Chair

Klausdieter PAHLKE

AAE, DLR

Klausdieter Pahlke graduated with a PhD in Engineering Sciences in Aeronautics in 1998. He became a scientist at DLR in 1987, and from 2006 was in the Group of Responsables Helicopter GARTEUR and German Representative in the International Committee of the European Rotorcraft Forum. From 2006 to 2020 he was Coordinator of DLR Rotorcraft Programme and German head of DLR-ONERA Cooperation on Rotorcraft Research. Since Nov. 2020 he has been Branch head of the Helicopter Branch of the DLR Institute of Flight Systems and Member of the VFS Dynamics Committee. Klausdieter is author/co-author of more than 75 publications on rotorcraft research.

Session 3a:

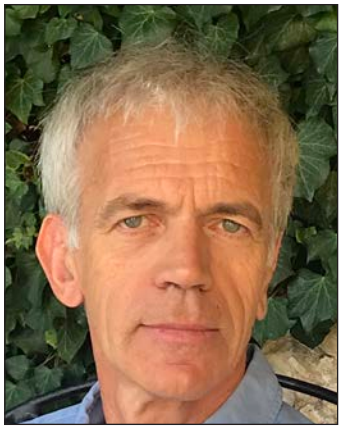
Technical perspectives including synergies with civil research programmes

Technical perspectives including synergies with civil research programmes

(joint presentation)

Éric DAUTRIAT

Vice-president of AAE, former Executive Director of the JU Clean Sky



Biography

After graduating from the Ecole Centrale of Lyon in 1977, Éric Dautriat joined SNECMA where he became head of civil engine pre-projects in the Technical Department.

He moved to CNES in 1985, where he was a delegate to the Ariane steering committee and the ESA scientific programme committee, before joining the Launchers division in 1988 as deputy director of the Ariane-4 programme, head of pre-launch projects, head of the Ariane 5 solid rocket motors project, and in 1997, director of launchers.

In 2003, he was appointed vice president Quality at Snecma, then at the Safran Group in 2007.

From 2009 to 2016 he was Executive Director of the Clean Sky joint venture in Brussels, dedicated to aeronautical research.

Eric Dautriat is Chevalier de la Légion d'Honneur.

Michel HANCART

AAE member, former Technical Director of Eurocopter and NHIndustries

Biography

Michel Hancart is a graduate of Ecole Supérieure d'Arts et Métiers and Ecole Spéciale de Travaux Aéronautiques.

He joined Sud-Aviation Helicopter Division (Marignane) in 1969 as a design engineer in charge of the new generation of bearingless rotor hubs development and later on became chief of project of the Dauphin Helicopter. He was appointed Design Office Technical Director in 1988, moved to Eurocopter Customer Service in 1992, and from 2005 to his retirement in 2008, headed the NH 90 programme Technical Directorate within the NH Industries consortium.

From 2010 to 2017 he was designated as an external reviewer of Cleansky 1 and 2 progress reports.

A member of the Air and Space Academy, Michel Hancart is Chevalier de l'Ordre National du Mérite, he was also awarded the Médaille de l'Aéronautique and the golden medal of the Société d'Encouragement pour le Progrès.

Summary

Under the care of Clean Sky Programme, the European Union supports the research effort of Airbus Helicopters and Leonardo Helicopters, in cooperation with engine manufacturers and European research centres, in order to reset high-speed rotorcraft development.

The general objectives of technology Programme Clean Sky 2, started in 2014 for a 7-year duration (at the level of commitment appropriations), are linked on the one hand to improvement of the environmental footprint of aircraft and, on the other, to European aeronautic industry competitiveness enhancement through innovation. It is shaped as a public-private partnership ("Joint Undertaking", legally external to the European Commission, with around 40 staff members) involving the participation of the Commission itself on one side and almost the entire set of all sizes European manufacturers on the other side. The total funding is about 4 billion euros.

The high-speed rotorcraft here addressed constitute one of the six divisions of this programme.

Based on a sequence of calls for proposals by the industrial leaders and validated by the Joint Undertaking, each project calls for a strong participation from Universities, Research Centres and SME through Europe. By such means, original cooperations become possible, contributing to identification of partners which would not have necessarily met otherwise. These partners are recruited in most European countries. It must also be mentioned that cooperation terms are established between the two European helicopter manufacturers, which remain competitors in other domains.

The general purpose of these projects is to reach high levels of technological maturity (TRL) through demonstrators allowing the test of technologies in representative conditions. The two high-speed rotorcraft projects introduced here are very typical. The environmental print improvement is subject to an official evaluation through consolidated industrial models (the Technology Evaluator).

It must be noted that the possibly dual civil/military character of some technologies or complete projects is not addressed in this programme. Only civil uses have been addressed as Clean Sky 2 objectives, for the "programme file" validation.

The innovation process starts from the established fact that the helicopter conventional architecture is now reaching its maturity: the expected ultimate evolutions mainly lie in the fields of all-weather flight capability, on board electric systems, noise reduction and optimization of life cycle cost, significantly higher than comparable fixed wing aircrafts.

Currently, the main rotor operating limits limit the practical cruise speed to 300 km/h and, except specific configurations, the range remains below 800 km/h. For that reason, a significant speed gap exists when comparing with turboprop fixed wing aircraft. New rotorcraft architectures succeed in closing the gap while keeping the unique helicopter advantage of vertical take-off and landing.

Such a speed increase would foster the development of new commercial and operational mobility options as well as the range extension for the same flight duration, opening the way to shift the economic index from usual [flight hour cost] towards [km x passenger cost]. Following the mission this aspect potentially compensates an over cost linked to more complex a design and its consequence on maintenance.

Two high speed configurations presently coexist at different development stages:

- The TiltRotor, featuring the forward tilting of two lateral sustaining propellers after take-off in helicopter mode in order to perform the cruise flight as a fixed wing aircraft. In this category, the V 22 Osprey has been operated by the US Marines for thirty years and the Leonardo A 609 is reaching civil certification. The prototype Bell 280 Valor prefigures the Osprey replacement.
- The Compound, based on the addition of an axial thrust to a helicopter main rotor ensuring lift in order to increase the translation speed. The prototypes Bell Defiant and Sikorsky Raider are equipped with a tail axial propeller while the demonstrator Eurocopter X 3 has proven the feasibility of two lateral axial propellers.

The two demonstrators launched within Clean Sky 2, targeting up to 500 km/h cruise speed and 1500 km range, plan the flight experimentation of a Leonardo tiltrotor named "New Generation Civil TiltRotor" inspired from the A609 and an Airbus Helicopters compound named "Racer" inspired from the X3.

The achievement of this innovative and ambitious programme will consolidate the European industry status in the exploration of new technologies and will develop an offer in a future high speed rotorcraft mobility segment, the validation of which will belong to civil and military operators as a function of their operational needs.

Clean Sky, an example of wide European cooperation in aeronautics

Caveat:

- *these are personal slides which don't commit Clean Sky Joint Undertaking*
- *This is about Clean Sky 1 & 2 programmes – not the recently started Clean Aviation*
- *Clean Sky 1 & 2 are dedicated to civil aeronautical research and technology (no dual applications considered within the statutes or programme plans)*

Clean Sky 1: 2009-2016; Clean Sky 2: 2014-2021 (as regards commitment appropriations)
Both established through EU Regulations (legal act) adopted by the Council

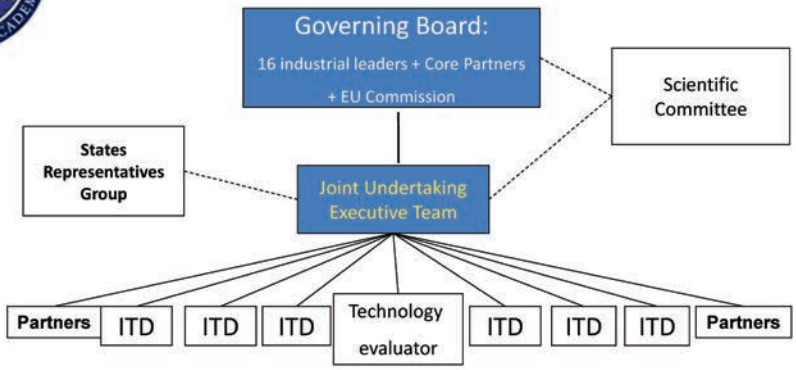
2

Largest EU aeronautical R&T programme ever

- A "***Joint Technology Initiative***" with public-private co-funding, 50/50
- Managed by a "Joint Undertaking", autonomous body (staff 40)
- Integrated technologies, industry-led, up to **full scale demonstrators**
- **Environment and competitiveness objectives**
- Clean Sky 2 programme started in 2014, with 4 B€ total funding (most of EU aeronautical R&I funding)
- Up to ~ 1000 participating entities in Clean Sky 1

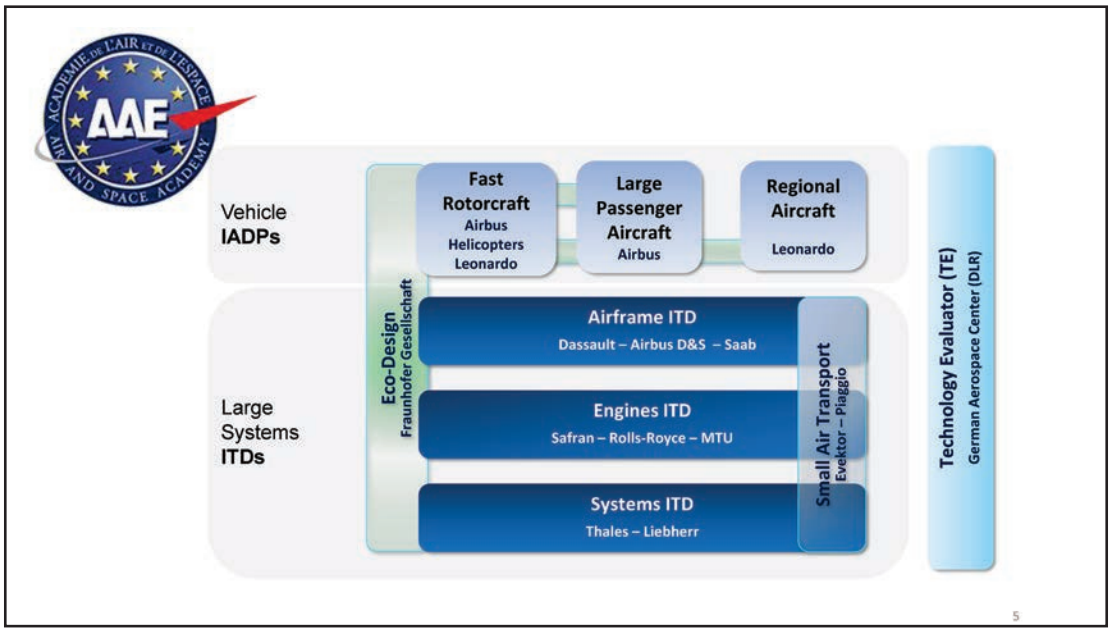
3

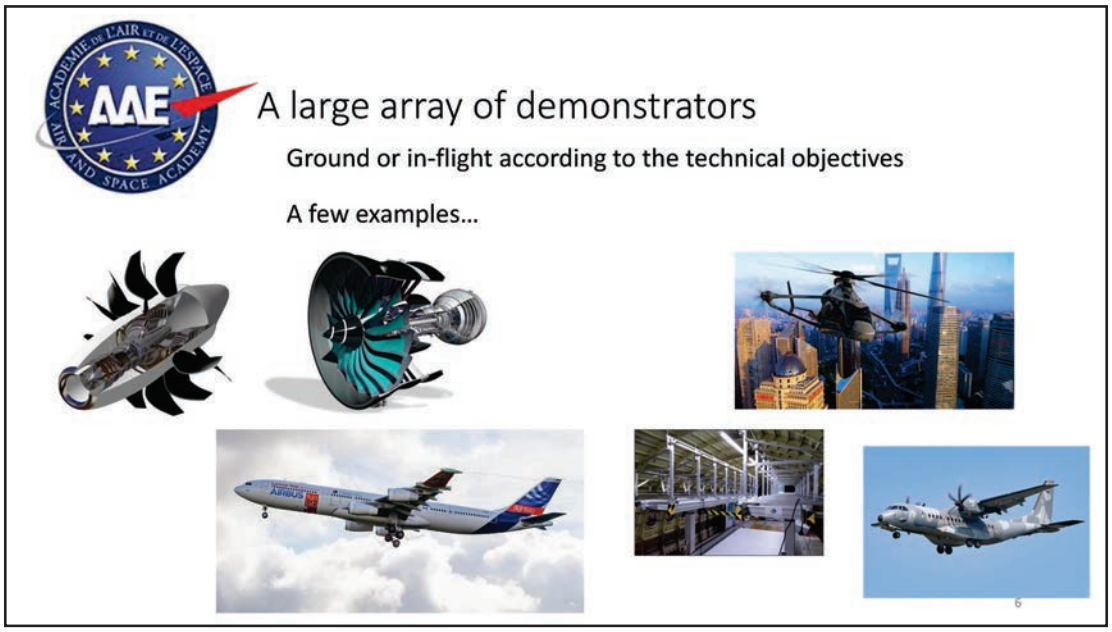
Governance and organisation

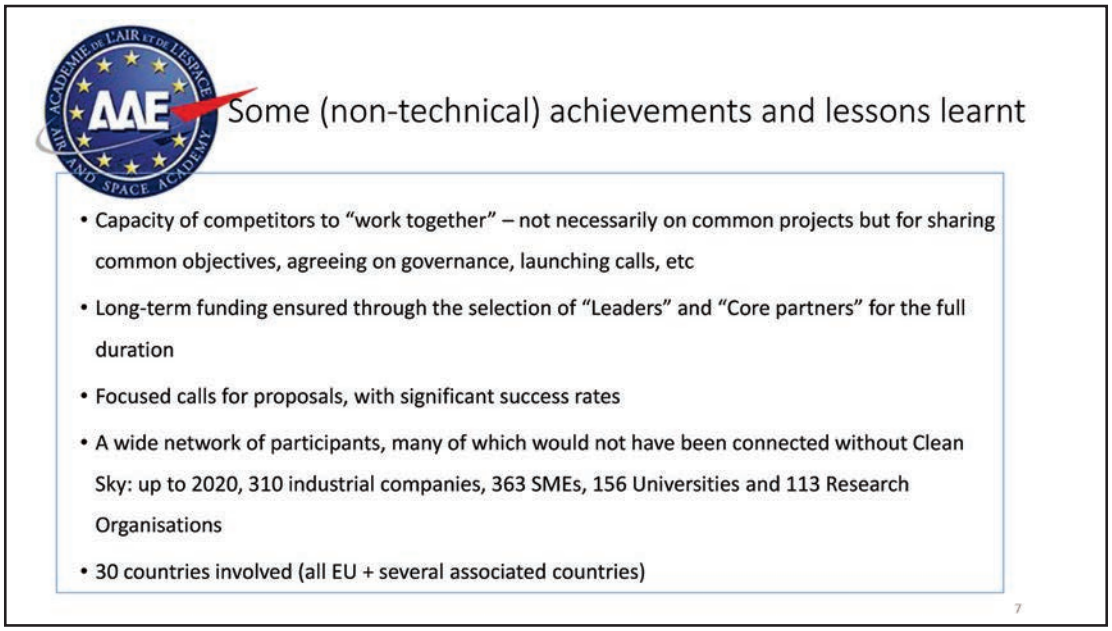


ITD: integrated Technology Demonstrator = technological platforms

4


Vehicle
IADPs
Large
Systems
ITDs
Fast Rotorcraft
Airbus Helicopters
Leonardo
Large Passenger Aircraft
Airbus
Regional Aircraft
Leonardo
Eco-Design
Fraunhofer Gesellschaft
Airframe ITD
Dassault – Airbus D&S – Saab
Engines ITD
Safran – Rolls-Royce – MTU
Systems ITD
Thales – Liebherr
Small Air Transport
Evektor – Piaggio
Technology Evaluator (TE)
German Aerospace Center (DLR)
5


A large array of demonstrators
Ground or in-flight according to the technical objectives
A few examples…
6


Some (non-technical) achievements and lessons learnt
• Capacity of competitors to "work together" – not necessarily on common projects but for sharing common objectives, agreeing on governance, launching calls, etc
• Long-term funding ensured through the selection of "Leaders" and "Core partners" for the full duration
• Focused calls for proposals, with significant success rates
• A wide network of participants, many of which would not have been connected without Clean Sky: up to 2020, 310 industrial companies, 363 SMEs, 156 Universities and 113 Research Organisations
• 30 countries involved (all EU + several associated countries)
7

ROTORCRAFT Technical Perspectives

15 JUNE 2022

MICHEL HANCART

HELICOPTER TODAY

Conventional architecture at maturity :
Practical cruise speed up to 300km/h (rotor limits)
Practical range up to 800 km (standard fuel cells)

Expected ultimate evolutions :
All-weather flight , electric systems , noise reduction , avionics/navigation aids , life cycle cost reduction …

Future consideration given to higher speed :
European programme **Cleansky 2** supports hybrid **tiltrotor** and **compound** rotorcraft architectures

HYBRID ARCHITECTURE

Helicopter vertical take-off + Aircraft mode translation

↓

Fill the 300-500 km/h mobility gap towards fixed-wing turboprop a/c with range increase above 1500 km

Two configurations :

TILTROTOR
forward tilting of two lateral sustaining rotors acting as propellers

COMPOUND
addition of an axial thrust to helicopter rotor ensuring lift

TILTROTOR - EUROPE

LEONARDO HELICOPTERS

Next Generation Civil Tilt Rotor

Cleansky 2 Demonstrator (2023)

11 t - 520 km/h - 1850 km

Precursor

Agusta Westland 609 (2003)
7,2t- 9 pax– 510 km/h- 1850 km

COMPOUND - EUROPE

AIRBUS Racer

(Cleansky 2 Demonstrator 2022)
8 t - 420 km/h

Precursor
EUROCOPTER X3
(demonstrator 2010)
472km/h

HIGH SPEED ROTORCRAFT FUTURE

Ambitious and innovative Cleansky 2 technology programme is an asset for European competitivity

Key issues for success :

- **Matching up with real operational and commercial needs**
  Life cycle cost under control
  Compensation of potential overcost vs pure helicopter by the increased range resulting in the introduction of [passenger x km] economic index (instead of flight hour cost)

Chair

Ing. Général (2S) Louis-Alain ROCHE

Lieutenant general (armement corps, retired) Louis-Alain Roche served 40 years in the French ministry of Defense. After 9 years in an industrial depot, from 1983 to 1986 in the aeronautical services department, he was responsible for Mirage production for the French air force. From 1988, he was appointed deputy director, then director of the Rafale programme. Between 1998 and 2005 he was appointed director of human resources of DGA, In 2005, he was tasked by the Ministry of Defence with setting up and steering a mission (MMAé) to modernise the maintenance of defence aeronautical material. From 2009 to 2014, he was appointed government commissioner to groups such as SAFRAN, SNPE, SAFT, CEGELEC, LACROIX. He has been a member of Air and Space Academy since 2010. He is Commandeur de la Légion d'Honneur et de l'Ordre National du Mérite, and was awarded the Médaille de l'Aéronautique.

Session 3b:

Management of a military programme in cooperation: example of OCCAR

Conditions of success for cooperative armament projects: example of OCCAR

Ing. Général (2S) Patrick BELLOUARD

Former Director of OCCAR-EA (Organisation for Joint Armament Co-operation) and Chairman of EuroDéfense-France

Biography

Major general (armament corps, retired), Patrick Bellouard served for 25 years in the French ministry of Defence (DGA / Délégation générale de l'armement). From 1999 to 2004, he was the director of the DGA department in charge of the management of all aeronautical programs for the French armies. Then he was missioned by the Prime Minister to coordinate all French ministries on the European Galileo program, from September 2004 to February 2008, before being the OCCAR-EA Director from March 2008 to February 2013. He has been a member of the EuroDéfense-France association since March 2013, assuming the position of Chairman of this association from April 2016 to April 2021. He is Officier de la Légion d'Honneur, Commandeur de l'Ordre National du Mérite and was awarded the Médaille de l'Aéronautique.

Summary

A new European geostrategic vision

On paper and in the minds of European people, the EU defence is progressing. Since 2016, with the Global Strategy for the European Union's Foreign and Security Policy putting forward the new objective of EU strategic autonomy, the word « defence » is no longer a taboo in Brussels. During the last five years the Member states have taken new initiatives to improve their cooperation in the defence domain, with the support of the Parliament and the Commission, starting by launching the Permanent Structured Cooperation and the Military planning and Conduct Capability in 2017 in parallel with the Brexit negotiations. Then the European Intervention initiative was launched in 2018: it involves 13 European nations. Proof once again, sad to say, that it needs a crisis for the EU to progress towards greater solidarity.

Since the beginning of 2020, with the COVID 19 crisis and its huge economic and social impacts, we have observed the vulnerability and dependences of Europe, in the health domain but more globally in the value chains in the economic domain (including defence). There is a feeling of global uncertainty and dependency.

The battle to halt the COVID 19 pandemic was a timely reminder of the importance of European strategic autonomy, already one of the features of the European Union's June 2016 Global Strategy for Foreign and Security Policy. It has highlighted the need to extend this autonomy to areas such as health and the numerous economic sectors where globalisation and unbridled competition have exposed the European Union and its Member States to a degree of dependency not only unacceptable but fraught with long-term risk. 2020 will, therefore, be remembered for two major developments that would most likely have been impossible if the UK had still been a member of the EU. Firstly, the European recovery plan, which represents a major step forward in terms of budget solidarity, in that Member States now share their first-ever common debt. Secondly, the European Defence Fund, which forms part of the Multiannual Financial Framework adopted at the end of the year 2020, adding to the EU's arsenal of weapons for boosting member cooperation over military equipment, increasing

defence capabilities, prompting European defence industry consolidation and, ultimately, substantially increasing the EU's strategic autonomy.

However, in spite of these initiatives, the level of cooperation between EU members in the armament domain remains too low. And the situation appears critical today, in particular since the start of the invasion of Ukraine by Russia in February 2022.

EU member states still have to meet the long-standing European collaborative equipment procurement collective benchmark – 35 % of defence equipment spending (decided by the EDA, European Defence Agency) ministerial steering Board in November 2007 and confirmed within the PESCO (Permanent Structured Cooperation) framework in December 2017. During the last 20 or 30 years, the level of cooperation remained somewhat stable at about 20 %. However, according to the EDA, in 2020 EU Member States have spent only 11 % of their defence equipment procurement expenditure on European collaborative projects. This dramatic drop in the level of cooperation is the consequence of the fact that most of the main cooperative programs have been launched more than 20 years ago and that no new major cooperative program has been launched since the A400M transport aircraft program in May 2003 or the FREMM frigates in 2005.

The EDA was created in 2004 to support the development of defence capabilities and military cooperation among the European Union Member States, stimulate (R&T) defence and strengthen the European defence industry but it has faced many obstacles which have limited its results, in particular a very constrained budget which has reduced its action (that was mainly because of UK before the Brexit decision). On the other hand, the permanent structured cooperation has not yet produced concrete results. Then the increase of armament cooperation in Europe is clearly one of the main objectives of the European Defence Fund which has been proposed by the Commission.

Conditions of success for cooperative armament projects : example of OCCAR

However, the success of a collaborative program needs a number of conditions, which can be obtained with the support of organizations and/or tools created by Europeans during the last 20 years, such as EDA and OCCAR.

1. **The first condition is the harmonization of the operational and technical specifications,** with the objective of the broadest commonality between national versions. For me the best example up to now is the A400M program, which does produce a really common aircraft for all participating Nations (and now its support is also common), contrary to what has been observed with many other cooperative programs, such as the NH 90 helicopter for instance.

   Following EDA's Long Term Review carried out in 2016-2017, Ministers agreed in May 2017 to reinforce the Agency's mission in the capability development process, as the major intergovernmental prioritization instrument at EU level in support of capability development, and the preferred cooperation forum and management support structure at EU level for participating Member States to engage in technology and capability development activities. This means that EDA has a major role to play in this harmonization process.

   And the last EU initiative, the strategic compass presented in March 2022, although its ambition remains too limited in some aspects, should help this harmonization process in Europe : it can be seen as the first European "White paper" on defence.

2. The second condition is the coordination of the national funding schedules and the plausibility of the declared **national needs and financial commitments, which must be legally binding** (as for OCCAR managed programs). Military needs and financial commitments of each Participating Nation of a program must be consistent and credible: the objective is to avoid that a Nation artificially increases its needs during the initial phase of the program, for example to obtain a better workshare in the program (even if the "juste retour" rule is not applied, as in OCCAR), and later on decides to reduce its commitments, with potential consequences for the other partners. When Nations decide to empower OCCAR for the management of the program, the financial commitment of each Nation is embedded in a program decision, which is legally binding (much more than an MOU), which means that each Participating Nation will bear all consequences of any modification of its initial commitment (reduction or withdrawal).

3. Then of course we need a competent management organization which can manage the program on behalf of the participating Nations, interact and place contracts with industry. This organization can belong to one of the Participating nations (as for the METEOR program, managed by the UK Defence department) or can be a multinational organization which can assure that all Participating nations interests are guaranteed on a equal basis : such a multinational organization – OCCAR – already exists since January 2001, and it has proved its great competence and efficiency for the management of cooperative programs. It can work for all European nations, although it is not an EU body.

4. On the industrial side, we obviously need also a competent industrial organization, assuming full responsibility of the program on behalf of the industrial partners and using the best competences of its partners (again avoiding the "juste retour" rule, as requested by the OCCAR convention which bans this rule). This "juste retour" rule is the worst poison the cooperative programs. It increases the costs and delays of cooperative programs, as it has been frequently observed in the past. The best way to avoid this rule is to have consolidated European industries in Europe, such as Airbus for example: the existence of Airbus has greatly facilitated the industrial organization for the A400M program, which has benefited from the existing competences in Europe for civil transport aircraft. The rule in OCCAR is to observe and report each year the global balance of workshare for all programs: OCCAR-EA, provides the Nations with explanations on the subject, for the benefit of their National Parliaments, and Nations are globally satisfied over the years without requesting any further action from OCCAR-EA.
5. We must also consider common **certification and qualification arrangements** from the outset of the program and search for the broadest basis of commonality in the corresponding process, as it has been organized for example for the A400M program. For the A400M, we requested the civil EASA certification for the basic aircraft and we created a common international experts' body for the additional military qualification, avoiding separate military qualification work by each Nation. This greatly facilitated the final qualification of the aircraft, reducing delays and costs for industry and for the Nations.
6. Last but not least, we need a strong political will of the European partners and the establishment of a good level **of confidence** between all undertaking parties during the whole life of the program.

Existing tools or organizations (EDA and OCCAR) must be more and more used by all European nations

On 18 May 2022, the European Commission published a Communication analyzing, at the request of the Council, defence investment deficits and remedies to overcome them. This document clearly highlights the need for Europeans to work better together, especially at a time when military spending is set to rise sharply in response to the war in Ukraine.

The European Commission underlines the risk that, as paradoxically happens during lean times, this abundance of resources will lead to investment choices that conflict with the strengthening of the European defence technological and industrial base. Out of a sense of urgency, states may indeed be tempted to buy off the shelf from the United States. They may also, out of a national reflex, seek to develop on their own territory solutions that are nevertheless available in another European country. In both these cases, the additional budget could lead to a weakening of the European defence industry, which is a key element in strengthening European strategic autonomy.

This is why the European Commission wishes to position itself as the coordinator and catalyst in the implementation of the effort to recapitalize the armed forces within the European Union. Without such coordination, «*short-term procurement will have a longer-term impact leading to a weakening of market strength and missed opportunities for the coming decades*». It therefore proposed a set of new instruments:

- a Defence Joint Procurement Task Force for short-term procurement;
- then the formation of European Defence Capability Consortia (EDCC) for the joint procurement of cooperatively developed solutions;
- and finally the project for a Joint EU defence programming and procurement function;
- all of which would be accompanied by financial incentives for investment and innovation (including VAT exemption).

The European Commission is thus seeking to overcome the limits demonstrated in the past of inter-state coordination of capability efforts. While the military investment effort was strongly impacted by budget cuts following the financial crisis of 2007-2009, the States preferred national withdrawal to a joint effort. As a result, the share of cooperative procurement has fallen from 20% in 2004 to just 11% today. Action by the European Commission would seem to be welcome to overcome centrifugal tendencies and ensure the proper use of public funds while strengthening European defence.

However, does this imperative justify the proliferation of new tools to meet this challenge? The temptation could be strong to develop a Community approach to defence investment. Admittedly, the Communication of 18 May 2022 does not go that far. However, it bears the seeds of the European Commission's desire to take matters into its own hands - and perhaps to replace the States. On closer inspection, all the dimensions of a defence industrial policy are brought together in the Commission's approach: grouped purchases in the short term but also in the longer term, aid for innovation, mapping

of the industrial base to manage resources and skills... All this is very similar to the missions of a defence procurement agency.

A stronger and more efficient European defence depends above all on making good use of existing tools. And there are some very good ones that are far from being exploited to their full potential. Rather than seeking to create new instruments, it is important to make full use of those that exist. The European Commission is already doing this in part by relying on OCCAR for its support of the MALE and ESSOR programs (with EDIDP funds, and potentially other programs which would be funded by the EDF) and by highlighting in its Communication the role that the European Defence Agency should play, but mobilization should go further.

Given the urgency of the situation and in order to limit centrifugal tendencies, it is more than ever appropriate to use existing instruments, such as EDA and OCCAR, rather than seeking to build new Community instruments which would take time to mature and could, moreover, conflict with the competences of the States in the field of defence.

Chair

Blanche DEMARET

AAE

From 1977, at Délégation Generale pour l'Armement (DGA) Blanche Demaret held several positions, first managing and contracting for the rotorcraft R&T industry, research centers and specialized universities. Then Deputy International Affairs, Department for Aircraft Projects, in charge of support for foreign customers and cooperation setting up for the airborne and aircraft programs dependent on French DGA. Then integrating ONERA in 2004 as Program Director for Rotorcraft, encompassing all the scientific disciplines of helicopter domain, such as aerodynamic, dynamic, flight mechanics. She was French head of DLR-ONERA Cooperation on Rotorcraft Research.
Blanche is a member of the Air and Space Academy and the Vertical Flight Society (USA). She is Chevalier de l'Ordre National du Mérite.

Session 4:
The Industry point of view

The Industry point of view

(joint presentation)

Jérôme COMBE

Head of Product Policy Strategy, Airbus Helicopters

Biography

Jérôme Combe joined French Air Force in 1986 where he spent 17 years.

Along these years as helicopter pilot, he participated to 1st Gulf war in 1991 with Operation Daguet. During his assignment to French Air Force Helicopter academy in Toulouse from 1995 to 1997, he was deployed 3 times as Combat SAR Pilot to Deny Flight and Joint Endeavour Operations in Brindisi detachment along with 20th USAF Special operations Squadron.

From 1998 to 2001 he was then detached 3 years in Royal Saudi Air Force on AS532 A2 Cougar as Combat SAR pilot instructor.

Jérôme retired as Captain in 2002 and joined Airbus Helicopters as Operational Marketing Manager for Military and SAR applications. After 5 years, he became Key Segment Manager for Business development for Military Lift solutions. In 2011 he became head of Product Policy in Marketing department.

In 2017 Jérôme joined Strategy department to become Head of Product Policy & Strategy. In this position, his role is to manage Airbus Helicopters Product Policy to define investments and capability roadmaps for AH civil and military programs at 2025, 2030 and 2040 horizons.

Andrea BIANCHI

Head of Product and Services Policies – Strategy & Innovation, Leonardo Helicopters

Biography

Andrea Bianchi joined Leonardo (then Agusta SpA) in 1992 as a young graduate, after a Master Degree in Aeronautical Engineering and the completion of National Service in the Italian Army.

His first assignment was in Design and Development of Gearboxes and Transmission systems, where he had the opportunity to work on different programs, such as AW109, AW101 and AW139, and, in particular, became Technical Team Leader for Design, Development, and Certification of Agusta A129 Combat helicopter Drive System.

Moving to Transmission Production in 2008, Andrea he became Head of Manufacturing Engineering in UK, responsible for all manufacturing engineering activities for new Builds/ R&O helicopter gearboxes, and, after a stint in Industrial Engineering as Head of Manufacturing Technologies, assumed the responsibility of Head of Manufacturing Engineering for all Leonardo plants involved in Rotor Drive System components and assemblies manufacturing.

In 2018 Andrea joined Strategy & Innovation department to become Head of Product and Service Policies, working on the definition of future Product Requirements & Objectives and contributing to capability gaps analysis and improvement requirements of Leonardo offerings vs. competitors.

José COSTA

Director of Business development, Safran Helicopter Engines

Biography

José Costa is Safran Helicopter Engines Business Development VP.

José started his aerospace career in South America where he held several positions in charge of the aftermarket sales for Safran helicopter and aircraft engines in the area. During this period he managed the commercial and institutional relationship with the main operators in the area and particularly with the different Armed Forces of the region operating Safran engines.

In 2018 he took over a position in Safran Helicopter Engines headquarters in Bordes in charge of the large tenders coordination with a focus on the key military tenders.

Since 2021 he's managing the business development activity for Safran Helicopter Engines.

Summary

The three speakers used a joint presentation listing running and future programmes, existing technologies, topics to be developed further and how to achieve this goal, with analysis of:

- Future Vertical Lift (US), the FLRAA (Future Long Range Assault Aircraft), the flight demonstration of the operational capability may last till 2030. FLRAA is aimed at partially replace UH60 BlackHawk utility helos. Two contenders: V280 Valor tiltrotor from Bell and DEFIANT X coaxial compound from Sikorsky and Boeing. both having the high-speed capability. The contract award for prototyping is planned end of 2022.
- NATO Next Gen Rotorcraft (NRGC) targeting Medium Utility/Naval helicopter, a concept study with consolidation of common requirements may bring some interesting "techno bricks" at the right time.
- ENGRT: the European rotorcraft major industries present a co-leaded proposal. Submitted to the European defense fund (this project has been selected by EDF after the forum).

The key points to be addressed rapidly in order to prepare the rotorcraft fleet renewal by a European product are:

- **Specifications on payload,** range, speed and possible answer by new technologies (high speed compound or tiltrotor)
- Operations capabilities: land, naval, utility (NH90)
- Power requirements
- Expectations in terms of industrial partnership
- Keep and consolidate European industries sovereign technologies and independence

The three partners already share the same objective to prepare a common answer to clear and harmonized definition of capabilities and specifications, to ensure economic and affordable reality.

To achieve these cost and efficiency targets which means clear affordability for the Governments, a key point is an alignment in timeline and specifications, a continuity in the governmental (or European) support (budget) as well as an agile organization to manage the programme.

SESSION 4

Chair: Blanche DEMARET

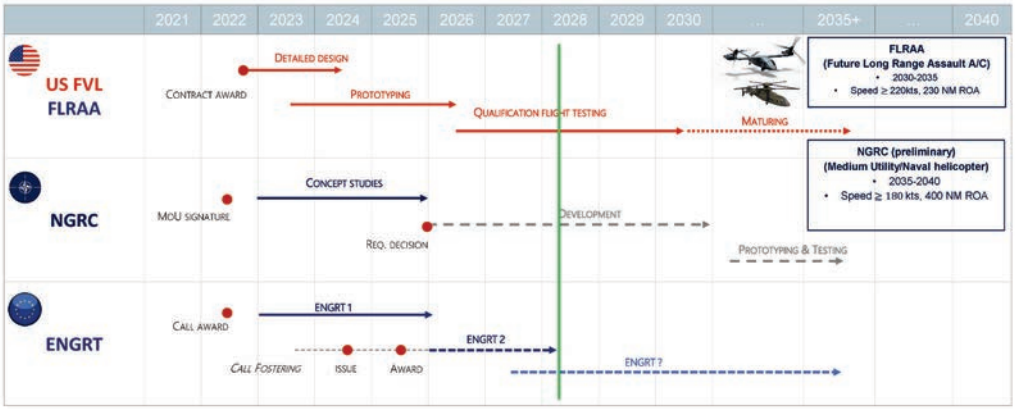
14:05-15:35

The industry point of view

- Airbus Helicopters, Jérome COMBE, H/O Portfolio Policy and Strategy
- Leonardo Helicopters, Andrea BIANCHI, Strategy & Innovation
- Safran Helicopter Engines, José COSTA, Director of Business development

HELICOPTERS

2030 -2035 context and challenges



2 29 September, 2022

LEONARDO AIRBUS

Europe and NATO are aiming at preliminary definition of next generation rotorcraft capabilities and technologies

NGRC

NATO Next Generation Rotorcraft

NATO OTAN

ATTRIBUTES

- Preliminary **attributes** issued in May 2021
  - Modular Open System Approach
  - 12-16 Pax , 400 nm RoA
  - 4000 Kg lift capacity
  - Cruise speed >220kts and no less than 180Kts
  - OPV Capable
  - Advanced Manned-UnManned Teaming
  - Modularity & High commonality land and maritime variants
  - Able to operate from Frigate-sized ships
  - Air transportable, Air-to-Air refueling
  - Availability >75%
  - Aggressive Fly away and Operating costs

*Source:ERF conf. 08/09/2021, IMH conf. 15/02/2022 & public news

TIMELINE

- **Studies on main subjects** would be initiated under the NGRC concept phase
- Said studies would lead to a **Preliminary Design Review towards the end of the concept phase**
- A **MoU** among participating Nations to structure collaboration approach **is expected**

ENGRT

European Next Generation Rotorcraft

MAIN HIGHLIGHTS

- Through the **European Defence Fund**, the EU is planning **to finance the ENGRT Program**, focusing on the development of next generation rotorcraft technologies, **involving the participation of major european OEMs** (including Leonardo Helicopter and Airbus Helicopters)
- **In 2021 the VTOL call has been issued** with the objective to jointly defining a common requirements set, CONOPS and technologies
- **LHD and Airbus have jointly answered** the call in December 2021 establishing, as co-leaders, a consortium involving also other European players
- **The award of the first activities phase is expected soon**

HELICOPTERS

European Next Generation Rotorcraft Technologies project (ENGRT) Ambition

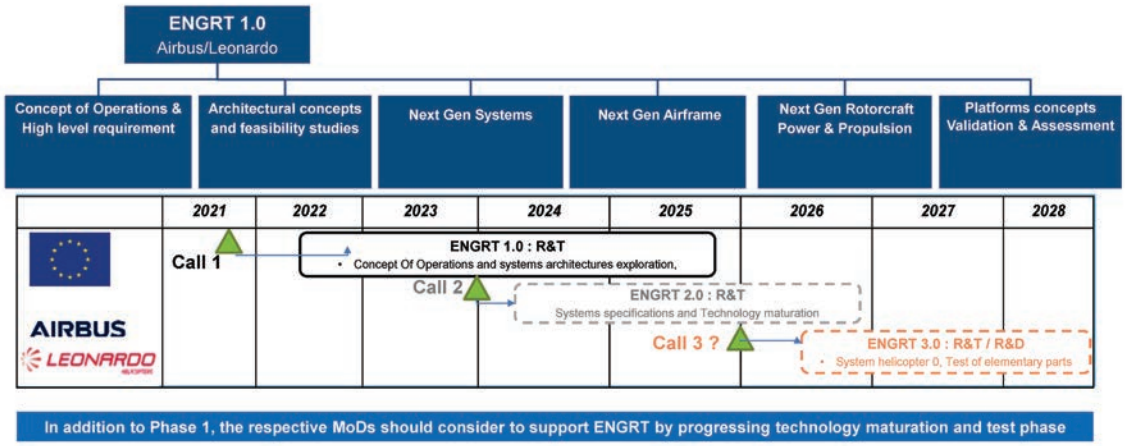
- ENGRT Ambition: Preserve EU sovereignty and **EU's Rotorcraft OEM's leadership on vehicle and systems architecture** and **prepare innovative and competitive supply chain** to ignite a consortium backbone with the aim to become a development project from 2025.
- ENGRT phase 1 objective will mainly be to **define** the 2040 operational requirements and **identify the technology gap to fill** linked to such requirement and provide **assessment of alternative** concerning potential vehicle architectures.
- Structured for a **simplified** leadership and **leaner** organization **to achieve effective deliverables**

- **A R&T project**, 100% financed by EU Defence Fund, with **40 M€** budget (Phase 1)
- A **50/50 partnership between Airbus and Leonardo** as ENGRT consortium co-leaders.
- LoI signed by **7 MoDs to support the project** (FR, IT, DE, SP, NL, FI, GR MoDs)
- **25+ participants in 12 EU countries**
- **EU defence fund grant expected end 2022**

4 29 September, 2022 LEONARDO AIRBUS

HELICOPTERS

European Next Generation Rotorcraft Technologies project (ENGRT) in a nutshell



In addition to Phase 1, the respective MoDs should consider to support ENGRT by progressing technology maturation and test phase

5 29 September, 2022 LEONARDO AIRBUS

The Scenario for NGRC

NGRC Requirements

Nato Support and Procurement Agency (NSPA) has circulated in late spring 2021 a list of preliminary technical requirements of program NGRC, highlighting:

- **Key Attributes** to be compliant with,
- **Preferred Attributes** that are desired in addition to the key ones.

- They are not discussed in detail, being them the domain of NSPA
- At this stage, a qualitative comment of these attributes can be offered

NGRC - The Requirement – Discussion, Leonardo View

NGRC Key Attributes

- At this stage, some attributes can be considered quite broad, giving significant margins of trade off in terms of design space envelope
- On the other hand, other key attributes narrow the potential design solutions towards specific architectures, i.e., fast rotorcraft (of any denomination, but with tiltrotor showing better compliance)
- **OPV capabilites, Open System Architecture philosophies and MUM-T are** instead, and by definition, **platform agnostic.**

NGRC Linked attributes (example)

- The **need for speed**, i.e. cruise speed above 180 kts, cannot be physically fulfilled by a conventional rotorcraft, but it fits within the domain of fast rotorcraft.
- This, combined with the attributes **for lift capacity** (4000 kg int+ext) and **number of troops** (16 max), pushes for a MAUM requirement at the high end of the proposed bracket.
- **Operability from relatively small naval ships**, like Destroyers and Frigates, therefore, becomes an important and challenging attribute
- **Speed** is also **a sort of by-product of the long range capability**, intrinsic to a tilt rotor architecture due to its high aerodynamic. By the way, a tilt rotor is self deployable.

NGRC Main takeaways

- **NGRC requirement** is clearly focused on **a medium lift rotorcraft** for troop transport and maritime operations.
- **Cost attribute** of the basic NGRC platform could strictly inform the design, in terms of architecture, research of innovative technical and maintenance solutions, etc. For instance, *speed* surely comes with cost, in terms of price and maximum weight.

HELICOPTERS

NGRC - The Requirement – Discussion, Airbus View

NGRC Key Attributes

- At this stage, some attributes can be considered quite broad, giving significant margins of trade off in terms of design space envelope
- On the other hand, other key attributes, if frozen, could narrow the potential design solutions towards specific architectures, i.e., fast rotorcraft.
- OPV capabilites, Open System Architecture philosophies and MUM-T are instead, and by definition, platform agnostic.

NGRC Linked attributes (example)

- The **need for speed**, i.e. cruise speed above 180 kts, can not be physically fulfilled by a conventional rotorcraft, and is within the domain of fast rotorcraft.
- The **need for range can be fulfilled by a conventional rotorcraft** but the value of the radius of action (400 Nm) will push for a MAUW at the high end of the proposed bracket
- **This, combined with the attributes for lift capacity** (4000 kg int+ext) and **number of troops** (16 max), pushes for a MAUM requirement at the high end of the proposed bracket
- Operability from relatively small naval ships, like Destroyers and Frigates, therefore, becomes a quite significant and challenging attribute

NGRC Main takeaways

- **NGRC requirement** is clearly focused on **a medium lift rotorcraft** for troop transport and maritime strike.
- The need for very long range further justify the interest for speed but this will **have a significant cost impact**
- **The concept of operation will be very important to clarify and give priorities between the different attributes**

AIRBUS

Leonardo path to the '40s,

Enablers, evolutions & building blocks

Platform Enablers evolution

MILITARY ROTORCRAFT

SURVIVABILITY
Ruggedness
Vulnerability reduction
Ballistic tolerance

HMI / AUTONOMY
Advanced HMI, with Synthetic Vision, Navigation aids in GPS denial, Augmented Reality
Flight assistance and remotization TLC protocols from unmanned aircraft system (e.g., Hover to Land, assisted OPV, Unmanned capability)

CONNECTED
Powerful data link and communications capability to exchange information with the Land, Naval and Air Forces (NET-CENTRIC)
Operation in a mixed, 5TH Gen, platform environment (e.g., MUM-T & ALE)

FLEXIBILITY
Operate in multiple warfare scenarios – both low and high intensity conflicts
Operate in diverse environments:
- harsh (hot/high, sandy to snow and ice),
- multiple threats (both sophisticated and improvised), on land and at sea

Leverage cutting edge dual use technology to improve reliability and operating costs

MISSION EFFECTIVENESS
Self - deployability / Transportability
Advanced Weapons system integration
Enhanced lethality
Ship integration

Platform Architecture – Fast Rotorcraft

*reference to generic designs and all missions PoF Point of Failure

DESIGN FEATURES (*)

DRIVE TRAIN
Reduce Complexity
Lubrication
On-condition
Maintenance
Damage Tolerance

STRUCTURE
Empty Weight fraction reduction

SURVIVABILITY
Reduction of single PoFs
Envelope Protection
Cyber resilience
Ballistic Tolerance

ROTOR
Optimized Blades
Damage Tolerance

PROPULSION
Thermal / Hybrid (future)

WING
Optimized aerodynamics & shapes

AIRCRAFT CONTROL
Fly By Wire
Sensors & Computing
Automation / Actuation
Reduced workload

VISION & NAV
PBN Navigation
All weather ops
DVE

CONNECTIVITY
Tactical Networking
MUM-T
Encrypted COM and Data

KEY ASPECTS

- **A key enabler** for the evolution of future Vertical Flight..
- Mastering **Fast Rotorcraft shall be a winning move** to maintain a strong OEM positioning within industry.
- **Tilt Rotor can exploit scalability/modularity of Architecture & Systems** towards a «product family» as per market demand.
- **Leverage on specific advantages**, i.e. *payload – range – speed* and higher *ceiling* in future designs.
- **Leverage various options to maximize Capability enhancements, with respect to Maneuverability, Hover vs. Cruise, Engine-Rotor Tilting, ease of Aircraft Control and Operations,**
- **Address low cost of production and operations**, with particular reference to Maintenance.

MILITARY/GOVERNMENT PERFORMANCE & PAYLOAD | MISSION CAPABILITY | AGILITY & SURVIVABILITY | AUTOMATION & AUTONOMY | COST

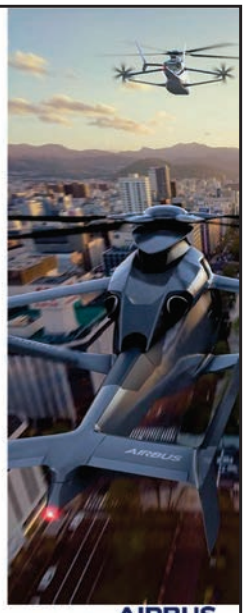
HELICOPTERS

Airbus view on High speed

- X3 first flight 2010
- 2016 validation of RACER aerodynamic design
- 2022 prototype assembly
- End 2022 first flight RACER

- Increase speed and :
  - Preserve Hover precision and downwash as a conventional helicopter
  - Preserve high maneuverability at any speeds for NOE flights
  - Don't increase complexity to preserver readiness and affordability

- Increase speed and improve helicopter weaknesses with:
  - Quick deceleration without flare and faster acceleration to shorten vulnerability period
  - Capacity High speed and slope approach >15° at 200 kts
  - Improved axial firing capacity : Steady nose down attitude (>20°) with constant speed from 60 kts to 200 kts
  - Reduced acoustic detectability : climb rate, and versatile trim in overflight and approach conditions allows large noise foot print reduction



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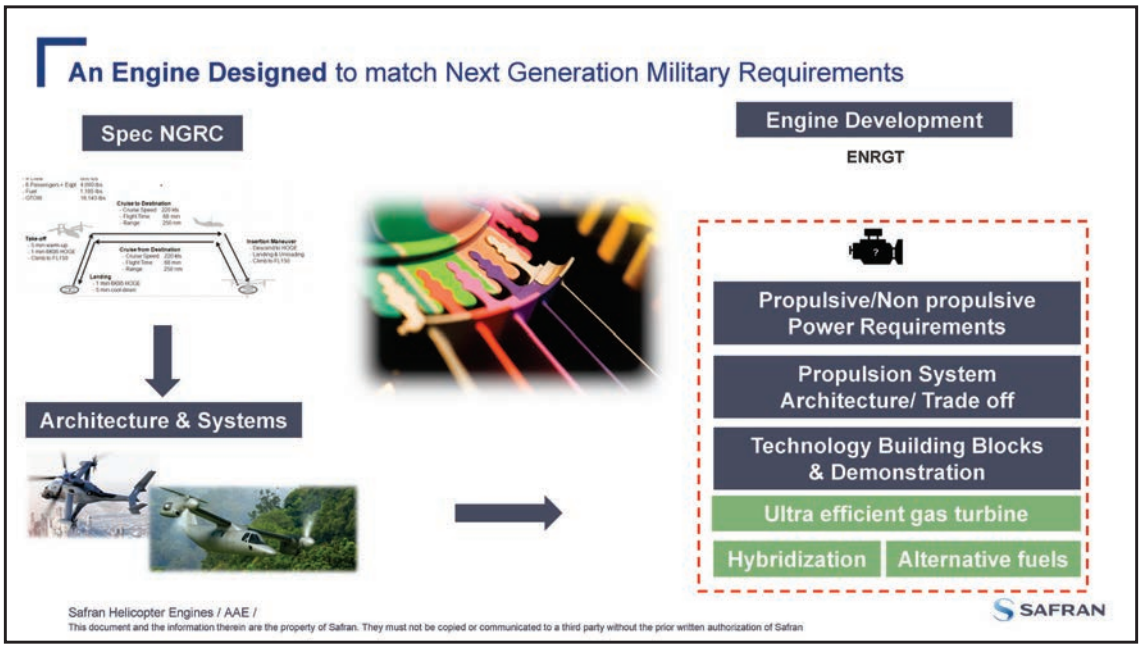
AIRBUS


An Engine Designed to match Next Generation Military Requirements
Spec NGRC
Engine Development
ENRGT
Architecture & Systems
Propulsive/Non propulsive Power Requirements
Propulsion System Architecture/ Trade off
Technology Building Blocks & Demonstration
Ultra efficient gas turbine
Hybridization
Alternative fuels
Safran Helicopter Engines / AAE /
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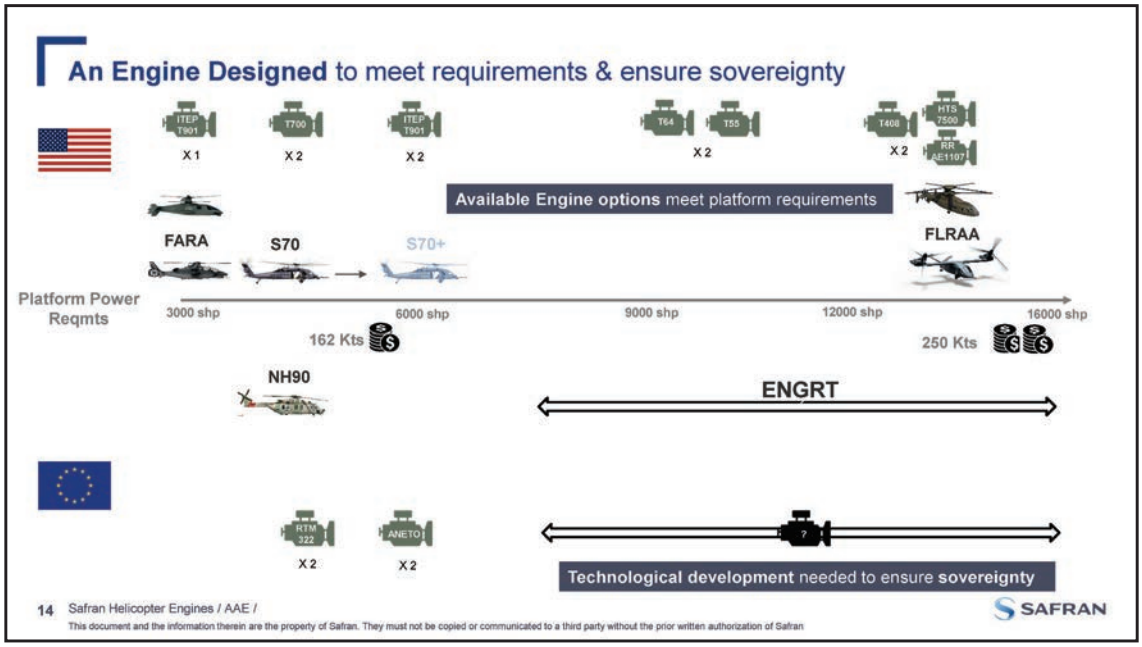
SAFRAN


An Engine Designed to meet requirements & ensure sovereignty
X 1
X 2
X 2
X 2
X 2
Available Engine options meet platform requirements
FARA
S70
S70+
FLRAA
Platform Power Reqmts
3000 shp
6000 shp
9000 shp
12000 shp
16000 shp
162 Kts
250 Kts
NH90
ENGRT
X 2
X 2
Technological development needed to ensure sovereignty
14
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4 Pillars to achieve the European Next Generation Military Helicopter Engine
1. Develop key technologies & innovation through strategic European financing
2. Strengthen European industrial footprint and its autonomy
3. Develop efficient partnership built on the partners strengths and demonstrated competencies
4. An appropriate regulatory framework in order to foster and protect an European know how
SafranHE is totally committed to this collaborative initiative and is convinced that it can play a strategic role
15
Safran Helicopter Engines / AAE /
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Final Message

"As leading vertical flight industry integrators and manufacturers, European Industries stand ready to play a central role in helping to define the requirements for the next generation rotorcraft and then develop and deliver an affordable, state-of-the-art product that provides our militaries with a winning edge, and support Europe in maintaining a sovereign capability"

Notes on Session 4: Industrial view

The following debate between attendance and speakers confirms that the objective is to define a competitive, affordable, effective programme and that industries are ready.

The key points underlined:

- The need for a common doctrine and common management organisation: for a successful programme, clear requirements are required, coming from doctrine and CONOPS, with Airworthiness agency acting for a common purpose, on a clear (and clean) definition of few configurations. In this matter NGRC could be a model.
- For military operations the key performance requirements for medium heavy are endurance, range and manoeuvrability.
- Session 2 speakers underlined the importance of reducing the number of helicopter types. When the operational mission needs different types of helicopters with different performances and different ages to operate together, this increases the complexity of the rotorcraft efficiency and the total costs.
- Some new technologies or performances are coming from the civilian market. It is underlined that performance should meet military needs and that, to date, high speed is not an operational requirement. The counter example of the US military programme Future Vertical Lift considers high speed as an important performance requirement for VTOLS. The EU approach of high-speed rotorcraft is led in Europe by industries.
- Civil vs military platform: if at the end the answer to specifications is a classical helicopter, industries are prepared to cooperate, but they need to build this clear statement.
- Rotorcraft fleets are composed of several types of helicopters and include numerous versions and upgrades during their long life. This must be managed for the whole life cycle.
- Future platform development will rely mainly on systems for autonomy and combat systems. But the military customers must solve the important debate on Mass and Capability. This is a very important basic dilemma to address before the next generation which is relying only on military priority.

AAE Dossier 51 shows clearly the 3 waves of developments of military platforms; the complementary view of the waves by Leonardo helicopters is:

- 1st wave was military land operational capability led
- 2nd wave was driven by civil sector adding safety requirements
- 3rd wave should consider convergence of needs in terms of airworthiness, safety, …

It can be noted that the next generation of products will be dealt with by the next generation of engineers, which is a key point: 2035-2040 products will be developed by engineers who are currently in engineering schools and may still even be in primary school. Aeronautics must stay attractive vis a vis GAFAM etc.

Blanche DEMARET, Chair of Session 4

Conclusions

In 2021, the Air and Space Academy published a dossier entitled "Towards new European military helicopter programmes" which recommended that, as with the two previous "waves" of cooperative programmes, a third "wave" should be initiated by an intergovernmental agreement.

The forum provided an opportunity to explore this subject in greater depth, but without looking into details items such as mission systems or weapons systems.

Session 1 set out the problem, with discussion of the following topics:

- the history of the helicopter fleets of European armies and in particular the two "waves" of rotorcraft developed in cooperation;
- the current situation in terms of fleets of various origins, European, American and Soviet;
- forecast of new requirements that could be the subject of a new “wave” of cooperative programmes.

Session 2 provided an opportunity for feedback on past experience and better forecasting of future needs, on subjects such as reliability and readiness, endurance, range, and (high) speed, coordinated use of unmanned aircraft, simplification of interfaces, all items to be considered in a changing world and various terrains. In this session mention was made of medium weight helicopters (not considered in the AAE dossier) and possible midlife upgrade of second wave helicopters.

Session 3 showed that in Europe we know what to do:

- through ambitious research programmes, such as CleanSky in the civil world, bringing together industrial and research players to acquire new aeronautical technologies and demonstrate the contribution of new formulae, and
- managing complex military programmes, provided that they are based on coordinated operational requirements and harmonised funding, which necessarily requires a common and strong political will over time.

Finally, Session 4 showed that, although they are competitors, European industries are ready to work together within the framework of European intergovernmental cooperation.

These considerations should be applied to future European military helicopter programmes.

The most advanced today is the heavy helicopter that will eventually replace the NH90, EH101, SUPERPUMA, Mi8/17 families and others. The launch of this new European military programme is urgent and will benefit from the work done on technologies developed within the EDF (European Defence Fund) and NATO frameworks.

As regards the other segments, the need is more remote, but a common roadmap at European level should be a shared objective:

- for very heavy helicopters there is very little chance of a cooperative program following Germany’s decision to buy 60 x CH47;
- for specialised armed helicopters, Tiger Mk 3, AW249 and Apache upgrades are all being developed in parallel but all based on vehicles from the 1980s and 90s. Political initiative is required to develop a common, probably conventional, possibly optionally piloted, attack helicopter from 2050.

Bernard FOUQUES, Chair of the forum

Chairs

Bernard FOUQUES, Ing. Général (2S) Louis-Alain ROCHE

AAE

(Short biographies on pages 7 and 32)

Round table

Round table - biographies

General Bertrand VALLETTE d'OSIA

Commander of ALAT

Major General Bertrand VALLETTE d'OSIA was born on 30th April 1963 in Saint Mandé (94).

He entered the École Spéciale Militaire de Saint-Cyr-Coëtquidan in 1984, class « général Monclar » (1984-1987) and chose infantry. He then attended the Infantry school of Montpellier (1987-1988) and the Army Aviation schools of Dax and Le Luc-en-Provence (1988-1989).

Posted as a patrol leader to the 3rd attack helicopter regiment in Etain, he was appointed captain in 1991 and took part to the Daguet (1991), Iskoutir (1992) and Balbuzard (1993) operations. In 1994, he was posted to the 6th attack helicopter regiment in Compiègne as a flight commander. In the summer 1997, he was assigned to the headquarters of the Army Aviation and was appointed major. In January 2000, he attended the Staff College's master course as part of the 113th class and the Joint Security College as part of the 8th class.

As Lieutenant-colonel, he was appointed head of the training operations office from 2001 to 2003 before being assigned to the Army Inspection Office.

Appointed colonel in 2005, he assumed command of the 5th attack helicopter regiment in Pau and took part to the Licorne operation in the Republic of Ivory Coast. In 2007, he was posted to the political and human resources department of the Army Defense Staff. In 2010, he became the head of the career coordination and transfer office at the Army Directorate of Human resources.

From 2013 to 2016, he served at the Secretary of Defense civilian cabinet and then as the Army Aviation General's executive officer.

He was appointed Brigadier General on 1st July 2017 in order to assume command of the 4th Army Aviation Brigade in Clermont-Ferrand. On 14th August 2019, he assumed command of the Army Aviation.

On 1st March 2020, he was appointed Major General.

Holder of two citations, Major General VALLETTE d'OSIA is Officier de la Légion d'Honneur et Commandeur de l'Ordre National du Mérite and was awarded the Médaille de l'aéronautique.

Franck DESIT

Deputy Director Capability, Armament and Planning, European Defence Agency

Franck Desit is Deputy Director Capability, Armament and Planning and Head of Unit for the Air domain at the European Defence Agency since September 2019.

He spent most of his career in the French Armament Procurement Agency (DGA), where he occupied different positions including Research Engineer, Programme Manager, Head of Cabinet of Test & Evaluation Directorate and Head of division for Capability Studies. From 2010 to 2013, he was assigned to NATO ACT as Executive Assistant to Deputy Chief of Staff for Capability Development. And from 2016 to 2019, he served as National Armament Director representative at the Permanent Representation of France to NATO in Brussels, where he notably contributed to governance of C4ISR and AIRC2 NATO programmes.

Franck Desit is Ingénieur en chef de l'armement. He is Chevalier de la Légion d'Honneur, Chevalier de l'Ordre National du Mérite, and he is a recipient of the NATO Meritorious Service Medal.

Ferre Van WILDER

On behalf of Admiral Matteo BISCEGLIA, General Manager of OCCAR

Fernand "Ferre" Van Wilder was born on 30 June 1964 in Deurne, Belgium. He joined the Royal School of Cadets in 1979 and the Royal Military School in 1982 where he graduated with a master's degree in aeronautical science in 1986.

He started as Supply Squadron Commander, after which he performed a variety of jobs in the Tactical Headquarters, the Air Force Staff and Joint Staff.

In 2005 he completed a master's degree in Strategic Studies at Air War College, in Montgomery Alabama, USA.

In 2007 he became the Belgian Air Force F-16 programme manager in the Systems Programme Office at Wright Patterson Air Force Base, Dayton, Ohio, USA.

In 2010 he switched from a US fighter programme to a European transport programme, becoming the A400M Logistic Support Officer at the OCCAR A400M Programme Division in Toulouse, France.

He returned to Belgium in 2015 to become the project manager for the implementation of the A400M in the Belgian armed forces.

In 2017 he retired from the Belgian Air Force. After a 4 year sabbatical he returned in 2021 to OCCAR to become the Business Development Officer in Bonn, Germany.

Roberto GARAVAGLIA

Senior Vice-president Strategy & Innovation,
Leonardo Helicopters - AgustaWestland Products

Biography

Roberto Garavaglia is a graduate of the Milan Polytechnic where he earned a Master in Aeronautical Engineering.

Currently he is SVP Strategy & Innovation of Leonardo - Helicopter Division, the leading helicopter OEM which employs about 13,000 people worldwide with the main industrial activities concentrated in Italy, UK, Poland and the USA.

He became SVP Marketing of AgustaWestland in 2010 and he held that position until June 2013. In July 2003 he was appointed to lead the AgustaWestland Marketing, where he and his Italy and UK-based teams contributed to product definition user segment development and sales achievements in both civil and military competitive markets.

In December 1998, he joined Agusta SpA and held a position as area manager for civil sales covering several Central and Northern European countries.

Between June 1991 and December 1998 he worked for ATR, the regional aircraft manufacturer in Toulouse (France), holding several posts in Marketing and Sales, eventually leading the Airline Marketing team. During the Aero International (Regional) JV period between ATR and Avro/Jestream (1995-1998), he was also involved in the pre-launch project definition, business planning and marketing activity of the AI(R)JET regional jet programme.

In 1989 he joined an Aero Engineering, an aeronautical design Company in Milan, dealing with systems and structural analysis and design on several civil and military aircraft programmes. Before that time, he spent one year as an officer in the Italian Air Force.

Jérôme COMBE

Head of Product Policy Strategy, Airbus Helicopters on behalf of Matthieu LOUVOT,
Executive Vice-President Programmes, Airbus Helicopters

Biography

Voir biographie de Jérôme Combe, page 38.

Round table - Summary

Bertrand Valette d'Osia, Commandant de l'Aviation Légère de l'Armée de Terre (COMALAT):

From the French military point of view, the objective of future helicopters missions for medium heavy Helicopters are

- To carry troops
- To support ground troops

The capabilities needed are :

- Survivability
- NOE (nap of the earth) flight or tactical flight

High speed is not a topic: the choice is targeting range and autonomy, maneuverability, stealth, and superior ability.

In the majority of the operational missions, different types of rotorcraft have to fly together for efficiency, the differences in terms of performances is an issue (waiting time for example).

The next step will need digitalization, with fully compatible systems between the platforms, manned or unmanned.

Franck Desit, Deputy Director Capability Armament, European Defence Agency:

This is the right time to address the future programmes.

The helicopter military market has a lot of niche segments, and each of them had its own missions.

The EDA Capabilities groups which include rotorcraft are:

- Transport and combat
- Mobility
- Air combat.

EDA is publishing Coordinated Annual Review on Defence (CARD). The main aim of CARD is to provide a picture of the existing defence capability landscape in Europe and to identify potential cooperation areas.

Through CARD review, EDA nations group are analyzing technologies and building blocks : for example 30 nations confirmed their interest for collaborative maintenance. The first CARD report was published in 2020. One of the identified target is Military Mobility, on which rotorcraft are a key actors.

It is now time to build a programme with consideration of :

- Relevant capability specifications for new helicopters, this will for sure need compromises
- Find an innovative and dynamic organization between EU members states to prepare, launch and manage (can be EDA + OCCAR)

Ferre van Wilder, on behalf of Matteo Bisceglia, General Manager of OCCAR:

The speaker underlined the OCCAR competencies demonstrated through several military aircraft, rotorcraft and military systems.

From past experiences to build such an organization needs a political appetite, with consideration of the readiness of the industries to cooperate.

Roberto Garavaglia, Senior vice-president Strategy & Innovation, Leonardo Helicopters:

It is time to prepare for future military rotorcraft programmes in a number of different segments.

Key point is the integration of rotorcraft mission systems using modular open architecture approach to ensure an easier and affordable update during the product life cycle.

Such future rotorcraft programmes should consider convergence of needs in terms of airworthiness, safety and mission capability which may require higher speeds and longer ranges for some users in certain theatres, and also be able to benefit from lessons and synergies achieved in civil developments.

Jérôme Combe, head of Product policy Strategy, Airbus Helicopters representing Mathieu Louvot, executive VP programmes, Airbus

Industrial partners are ready to cooperate, sharing the same objective; the major and key point is to harmonize definition of capabilities and specifications at EU level, prepared by harmonized doctrine and requirements.

Then, to insure economic and affordable reality it is important to install a continuity in the governmental (or European) support (budget) as well as an agile organization to manage the program.

To achieve these cost and efficiency targets which means clearly affordability for the Governments, a key point is an alignment in timeline and specifications,

The draft should begin soon, and this forum was in time to pinpoint this need.

The specifications should include not only the platform ones but should address attrition of the material, expansion of missions, common training (all task all material, ….) and the resilience of the supply chain.

Wrap up

Forum chair Bernard Fouques, closing the forum, thanks all participants, speakers and larger public of the Round Table.

As a very short conclusion to the table ronde, he states:

We, in Europe, can manage new military helicopter programmes:

Our industries know how to cooperate;

but we must succeed in defining coordinated operational requirements and a harmonized funding, both conditions which necessitate a strong political will over time!

See you in a few years…and let us see the results in 15 to 20 years.

Acknowledgements

Many thanks to our sponsors Airbus, Leonardo and Safran for their financial support, to Coges Events for their logistical support and to GICAT for sponsoring the round table and the following cocktail.

Our thanks to all speakers for their stimulating presentations.

Moving forward

In 2023, the Air and Space Academy (AAE) will publish an Opinion paper based on the forum outcomes. This document will be sent to policymakers and will also be freely available on its website.

AAE will continue to support the process, making available its members' expertise to the European actors involved in military programmes.

PROGRAMME COMMITTEE

CHAIR:	Bernard FOUQUES
CO-CHAIR:	Louis-Alain ROCHE
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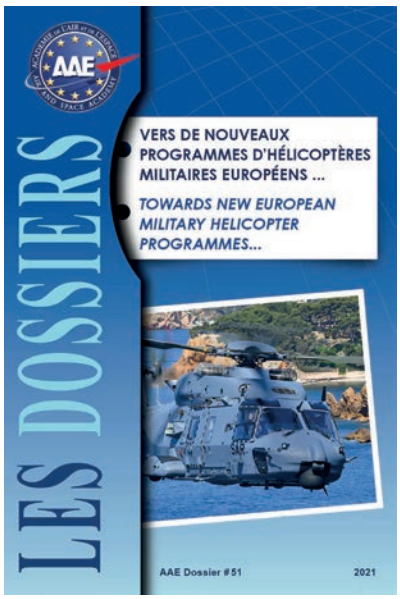

AAE DOSSIER 51

64 pages, 2021, FR-EN

Towards new European military helicopter programmes ...

An Air and Space Academy working group carried out an analysis that looked back on the development procedure of today's military rotorcraft, the vast majority of which were built in European cooperation, in order to identify the needs, threats and specifications to be taken into account for a new generation of VTOL (Vertical Take-Off and Landing) aircraft and the proper methods for European cooperation.

The purpose of this dossier is to issue recommendations for the near future. It is now urgent to determine and implement fleet renewal by means of European inter-army cooperation through a harmonisation of requirements.

The Air and Space Academy recommendation is therefore to prepare, without delay, an agreement at State level on the three identified segments - heavy and tactical utility helicopters, very heavy helicopters and specialised armed helicopters - and allocate leadership among participants in order to define the priority axes for European cooperation.

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PROGRAMME

09:30 **INTRODUCTION** Chair: Bernard FOUQUES

Welcome address

- Michel WACHENHEIM, president of the Air and Space Academy (AAE)

09:40 **SESSION 1** Chair: Bernard FOUQUES

AAE Dossier 51: summary & recommendations

- Bernard FOUQUES, AAE

09:55 *Coffee break*

10:05 **SESSION 2** Chair: Andrew WARNER

Evolution of operational needs

- Lieutenant General (ret) Danilo ERRICO
- General (2S) Olivier de la MOTTE
- Major General (ret) Reinhard WOLSKI

11:50 *Buffet lunch*

12:50 **SESSION 3a** Chair: Klausdieter PAHLKE

Technical perspectives including synergies with civil research programmes

- Éric DAUTRIAT, vice president AAE
- Michel HANCART, AAE

13:20 **SESSION 3b** Chair: Ing. Général (2S) Louis-Alain ROCHE

Management of a military programme in cooperation: example of OCCAR

- Ing. Général (2S) Patrick BELLOUARD

13:50 *Coffee break*

14:05 **SESSION 4** Chair: Blanche DEMARET

The industry point of view

- Airbus Helicopters, Jérôme COMBE, H/O Portfolio Policy and Strategy
- Leonardo Helicopters, Andrea BIANCHI, Strategy & Innovation
- Safran Helicopter Engines, José COSTA, Director of Business development

15:35 **CONCLUSION**

- Bernard FOUQUES

* * *

16:00 **ROUND TABLE**

Chairs: Bernard FOUQUES, Ing. Général (2S) Louis-Alain ROCHE

Participants:

- General Bertrand VALLETTE d'OSIA, Commander of ALAT (French Army Light Aviation)
- Franck DESIT, Deputy Director Capability, Armament and Planning, European Defence Agency
- Ferre Van WILDER, representing Admiral Matteo BISCEGLIA, General manager of OCCAR
- Roberto GARAVAGLIA, Senior Vice-president Strategy & Innovation, Leonardo Helicopters
- Jérôme COMBE, H/O Portfolio Policy and Strategy, Airbus Helicopters, representing Matthieu LOUVOT, Executive Vice-President Programmes, Airbus Helicopters

17:00 *Cocktail courtesy of GICAT*

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