CEAS
Council of European Aerospace Societies

BULLETIN

AEROSPACE EUROPE

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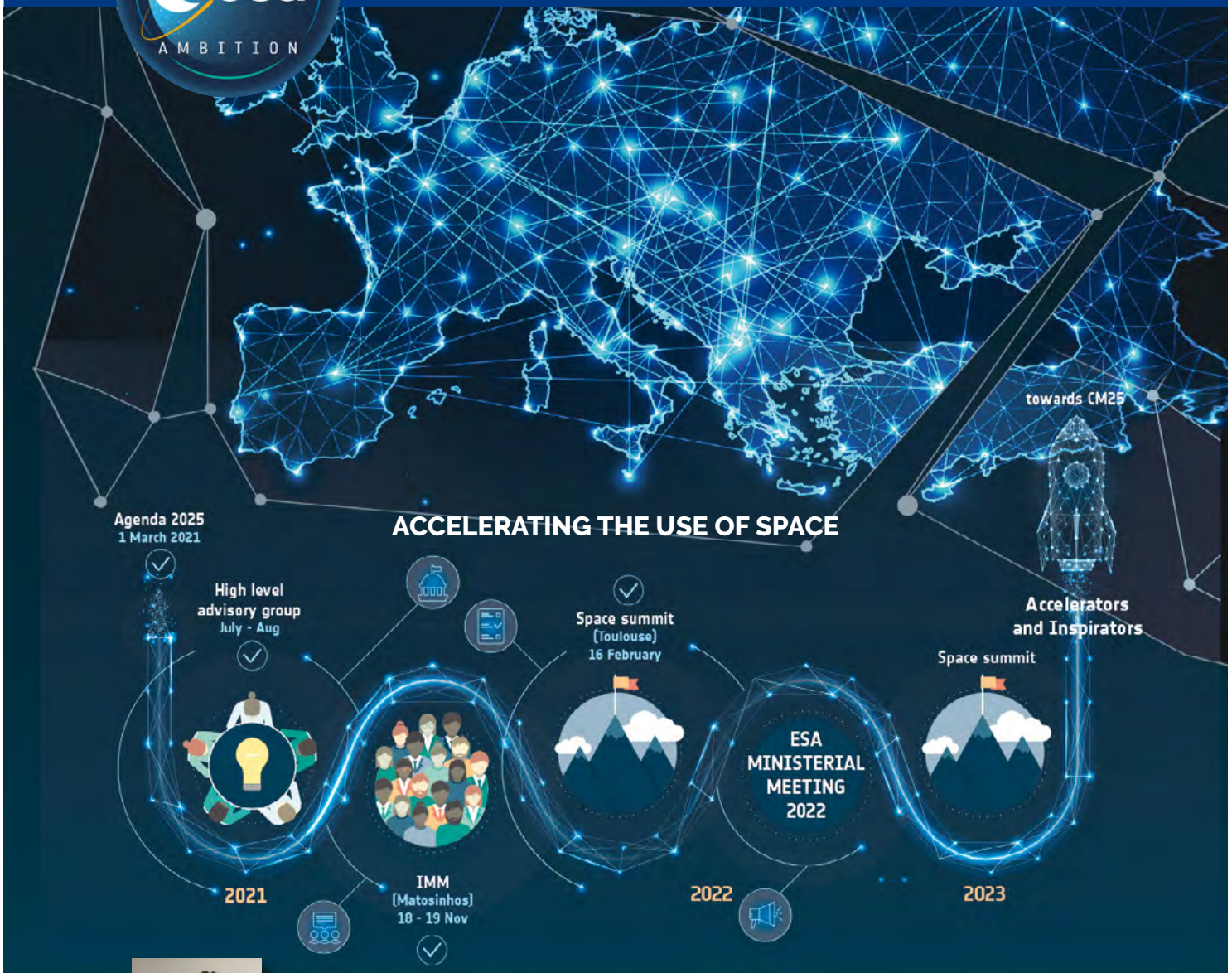

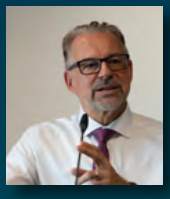

INTERVIEW WITH JOSEF ASCHBACHER, DIRECTOR GENERAL OF ESA *(see p. 7 to 10)*

CEAS

The Council of European Aerospace Societies (CEAS) is an International Non-Profit Organisation, with the aim to develop a framework within which the major European Aerospace Societies can work together.
It was established as a legal entity conferred under Belgium Law on 1st of January 2007. The creation of this Council was the result of a slow evolution of the 'Confederation' of European Aerospace Societies which was born fifteen years earlier, in 1992, with three nations only at that time: France, Germany and the UK.

It currently comprises:

- 11 Full Member Societies: Czech Republic (CzAeS) – France (3AF) – Germany (DGLR) – Italy (AIDAA) – The Netherlands (NVvL) – Poland (PSAA) – Romania (AAAR) – Spain (AIAE) – Sweden (FTF) – Switzerland (SVFW) – United Kingdom (RAeS);
- 4 Corporate Members: ESA, EASA, EUROCONTROL and EUROAVIA;
- 9 Societies having signed a Memorandum of Understanding (MoU) with CEAS: AAE (Air and Space Academy), AIAA (American Institute of Aeronautics and Astronautics), CSA (Chinese Society of Astronautics), EASN (European Aeronautics Science Network), EREA (European association of Research Establishments in Aeronautics), ICAS (International Council of Aeronautical Sciences), KSAS (Korean Society for Aeronautical and Space Sciences), PEGASUS and Society of Flight Test Engineers (SFTE-EC).

CEAS is governed by a Board of Trustees, with representatives of each of the Member Societies. Its Head Office is located in Belgium: c/o DLR – Rue du Trône 98 – 1050 Brussels. www.ceas.org

AEROSPACE EUROPE

Since January 2018, the CEAS has closely been associated with six European Aerospace Science and Technology Research Associations: EASN (European Aeronautics Science Network), ECCOMAS (European Community on Computational Methods in Applied Sciences), EUCASS (European Conference for Aeronautics and Space Sciences), EUROMECH (European Mechanics Society), EUROTURBO (European Turbomachinery Society) and ERCOFTAC (European Research Community on Flow Turbulence Air Combustion).
Together those various entities form the platform 'AEROSPACE EUROPE', the aim of which is to coordinate the calendar of the various conferences and workshops as well as to rationalise the information dissemination.
This new concept is the successful conclusion of a work which was conducted under the aegis of the European Commission and under its initiative.

The activities of 'AEROSPACE EUROPE' will not be limited to the partners listed above but are indeed dedicated to the whole European Aerospace Community: industry, institutions and academia.

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YOUNG PROFESSIONAL AEROSPACE FORUM SPONSORING

AEROSPACE EUROPE Bulletin

AEROSPACE EUROPE Bulletin is a quarterly publication aiming to provide the European aerospace community with high-standard information concerning current activities and preparation for the future.
Elaborated in close cooperation with the European institutions and organisations, it is structured around five headlines: Civil Aviation operations, Aeronautics Technology, Aerospace Defence & Security, Space, Education & Training and Young Professionals. All those topics are dealt with from an overall European perspective.
Readership: decision makers, scientists and engineers of European industry and institutions, education and research actors.

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THE VITALITY OF CEAS

First of all, I wish to thank very much Josef Aschbacher, DG of the European Space Agency, to have accepted an interview by me in early September, and I am pleased to publish in this bulletin the report on our discussions. It comes in the nick of time, just a few weeks before CM22, the upcoming ESA Council Meeting at Ministerial Level to be held in Paris in the last quarter of November. Among most important demands that will be formulated is: "Accelerating the use of space".

Then as usual I have tried to cover all other domains of aerospace, most notably:

- Civil Aviation with an interview with Luc Tytgat, presenting the main lines of the R&I programme being conducted at EASA, the European Aviation Safety Agency;
- Aeronautics Technology through the executive summary of the conference organised by COIAE in last February in Madrid: "The path of aviation industry towards environmental sustainability";
- Defence and Security with two papers from OCCAR, Tiger MkIII and the European MALE RPAS programme.

Besides, the report on the Board of Trustees meeting of last June presented by our Director General Andrea Alaimo illustrates the vitality of CEAS. Among several actions, I want to highlight two of them: on the one hand the MOU signed with PEGASUS, the organisation which aims at fostering cooperation between aerospace universities and higher schools in Europe, and on other hand, the CEAS participation in the KSAS 2022 Conference organised by the Aerospace Korean Society on 16-18 November in Jeju, Korea.
As for the CEAS Aeronautical and Space Journals, they pursue their regular increase in quality and ranking.

Now, together with EUCASS (European Conference for Aerospace Sciences), we are entering in the process of preparation of the upcoming **AEC2023**, the Aerospace Europe Conference which will take place from 9 to 13 July i2023 in Lausanne (Switzerland). This conference, whose ambition is to deal with the most important topics regarding the future of aviation, aeronautics and Space in Europe, will require for ensuring its full success a lot of work and a high level of motivation .

We are ready!

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CEAS PRESIDENT'S MESSAGE

Franco Bernelli Zazzera
CEAS President 2021-2022

As the year is coming to an end, I can start summarising the most notable achievements and the coming challenges for the near future. With no doubt, 2022 has been radically different from 2021, when the Covid pandemic was still heavily affecting Europe and as consequence most of the standard networking activities. This year has instead marked a discontinuity. Starting in late Spring, all the traditional events, such as exhibitions and conferences, have regained momentum and have seen consistent participation. There has even been an excess of proposals and, in particular, conferences, since many events planned for 2020 and 2021 have finally been rescheduled for 2022. The CEAS community registered a record participation to the IFASD conference in Madrid in June and a strong participation in the HiSST conference in Bruges in September. It is impressive to notice that the 2022 editions of ICAS congress and IAC have both registered a record number of participants, with both events held in September, one just before and the other right after HiSST. All this with minimal participation from far-Eastern countries, where travel restrictions are still in place. This shows that the scientific community has never stopped working even during the pandemic and was eager to capture the opportunities to share results and ideas. Similarly, the last CEAS Board of Trustees meeting, held in Stockholm during the ICAS congress saw strong participation. The meeting room was full, with no further seats available.

The impressive list of major aerospace events planned for the future is reported at the end of this issue of the Bulletin, from which it appears clear that also next year looks very promising and challenging.
With these premises, CEAS is looking forward to one of its major challenges for 2023, the joint conference with EUCASS, named Aerospace Europe Conference 2023. The event is at an advanced planning stage and soon the call for papers will be opened. The CEAS Board is committed to the event and now I call on all the CEAS members for support in all possible directions. On the one side, I hope the event will receive strong participation, we aim at the largest ever aerospace conference in Europe. This will also need a strong participation in the paper review process, to guarantee fair and proper selection of the papers.
On the other side, expecting a huge participation from the academic and research community, I look forward also to a strong participation from industry to create a positive impact and show the strength of the European aerospace sector at all TRLs. To ensure presence also from the student community, CEAS has already approved to support participation of students selected by its member societies, as long as they will also present a paper at the conference.

The joint event is a challenge for both CEAS and EUCASS since we need to adapt two slightly different ways of operating. The premises so far are encouraging and I must acknowledge the truly cooperative approach of EUCASS. Our Swiss member society SVFW is committed and already engaged and the local host, the city of Lausanne and EPFL, have already made all the necessary plans for logistics. All the interested persons should then keep an eye on the conference website to be constantly updated on the progress, deadlines, and highlights of the event. As highlighted by some of the contributions to this Bulletin, the European aerospace sector is vital and very broad, covering almost any industrial, research and educational aspect. Hopefully this will also be reflected in our Aerospace Europe Conference.

INTERVIEW WITH DIRECTOR GENERAL OF ESA JOSEF ASCHBACHER

By Jean-Pierre Sanfourche, Editor-in-Chief

*Born in Austria, **Josef Aschbacher** studied at the University of Innsbruck, graduating with a Master's degree and a PhD in natural sciences. He has had an accomplished international career in space, combining more than 35 years' work experience at ESA, the European Commission, the Austrian Space Agency, the Asian Institute of Technology and the University of Innsbruck.*

As Chief Executive Officer of ESA, Dr Aschbacher is responsible for the definition, implementation and development of Europe's space infrastructure and activities, which include launchers, satellites performing Earth observation, navigation, telecommunication and space science, together with robotic exploration and ESA astronauts working on the International Space Station. He is responsible for an annual budget of €7 billion and a workforce of 5500 distributed across several establishments, principally in Europe.

When taking up office as ESA Director General, Dr Aschbacher published a new strategy for space in Europe, called 'Agenda 2025', aimed at accelerating significantly the use of space in Europe through major new initiatives and programmes.

From 2016–21, he was ESA Director for Earth Observation Programmes and Head of ESA's ESRIN establishment in Frascati, Italy. He has been a key leader of the European Copernicus programme, which has grown beyond all expectations and is now considered to be one of the most ambitious and successful Earth Observation Programmes in the world.

He worked in various functions within ESA from 2001 onwards both in Paris and Frascati. From 1994–2000, he worked at the European Commission's Joint Research Centre, in his latest position serving as Scientific Assistant to the Director of the Space Applications Institute. From 1991–93 he was stationed as ESA Representative in Southeast Asia, where he developed projects in the Asian region while, at the same time, working in a full-time academic teaching capacity as Associate Professor at AIT Bangkok.

In 2021, Dr Aschbacher became 'Grande Ufficiale Ordine al Merito della Repubblica Italiana', the highest recognition accorded to non-Italian nationals.

Paris, 3 September 2022

I would like first of all to thank you very much for having accepted this interview, two months before the 2022 ESA Ministerial Council, and at the time when the launch of Artemis I is approaching.

Could we review the development status of the ESA priorities 2025 you defined shortly after you started your function as Director General at ESA last year, May 2021?

The moment I took up my duties as Director General, I clearly announced my intention to give ESA the mission to accelerate the use of space in Europe, to boost commercialisation and to pursue the benefits of space for all citizens and to increase the international cooperation (USA, China, ...). On 1 March 2021, I published the 'Agenda 2025' which I had worked out with our Member States to define our new priorities. This document outlines the challenges ahead – in the first instance for the 4 next years – but also for the long term in maintaining growing Europe's role in the worldwide space economy. It presents our 5 PRIORITIES:

- 1. To strengthen ESA-EU relations
- 2. To boost commercialisation for green and digital Europe
- 3. To strengthen space for safety and security
- 4. To address programme challenges
- 5. To complete 'ESA transformation'

Could we review them briefly?

Yes of course.

Why strengthening ESA-EU relations?

As a matter of fact, ESA and the EU have to work more and more hand in hand to be able to respond to the challenges ahead of us. A critical instrument is the FFPA (Financial Framework Programme Agreement) which was signed on 22 June 2021. This agreement represents an important step forward in the relationships between ESA and EU. The new EU space programme ensures the continuity and reinforces the successful flagships Galileo, Copernicus and EGNOS which were designed by ESA, comforting Europe in a global leading role in the area of positioning/navigation, Earth Observation and Space Traffic Management (STM). The FFPA represents an investment of about €9 billion covering the period 2021 to 2027 for ESA and the European industry to design New Generation systems and programmes, essential for the economy and green and digital programmes as defined by ESA Member States.

How to boost commercialisation for green and digital Europe?
I have established a Directorate for Commercialisation, Industry and Procurement and nominated Géraldine Naja as Director, who took up her duties on 1st November 2021. Her role is to support and enable European space companies to be among the best, the most performant, and strongest contributors to a greener and more digital economy recovery. This Directorate, which actually counts 150 employees, has to define a clear commercialisation procurement policy, rules and procedures. It has to develop the 'New Space' approach, create a great entrepreneurial spirit, foster innovation and ideas including in particular supporting start-up companies, encouraging smaller and focused satellites development and further implementing shorter lead time for procurement processes and contracts with the European industry.

Strengthening space for safety and security
Cyber resilience is vital for the integrity of our space data and communications: here the Galileo system will play quite an eminent role.
For ensuring civil security from space, a large programme is under definition, based upon Earth Observation and Telecommunication satellites. Its total cost is estimated at about €250 million. The financial volume of the civil security programme is €140 million.

Safety covers the Space Debris issue. The 'Clean Space' programme is under development, involving ESOC, the European Space Operations Centre of Darmstadt. CleanSpace-1 will be the first mission to remove an item of debris from orbits. This mission, procured as a service-contract with a start up-led consortium. Its launch is expected to take place in early 2025. You can imagine the level of this challenge...

What about launching new programmes?
The intention is to initiate new flagship space projects aiming at addressing the ever-evolving needs of society. Reducing launch costs will be a permanent and imperious obligation. Among programmes: digital global village with secure and fast connections, renewed presence in Low Earth Orbit (LEO), human space explorations. Machine Learning, quantum technologies and Big Data sets will be used to work faster and smarter.

Is the 'ESA transformation' well getting under way?
ESA has to be a greener, younger and more diverse organisation. Next year a significant percentage of employees will reach the age of retirement, so opening the possibility to recruit a very high number of young people. The organisation will be encouraging dynamism, fast reactivity and developing initiative and innovation spirit, in a way the start up spirit. Women will be better represented in the workforce, including at executive board level. Three women have been recently nominated at executive board level: Géraldine Naja as Director for Commercialisation, Industry and Procurement – Elodie Viau as Director for Telecommunications and Integrated Applications – Simoneta Cheli, as Director of Earth Observation programmes, so succeeding to myself. Presently the percentage of women in the staff is around 25%.

I presume that EUSPA plays a major role in the reinforcement of the EU-ESA relationships?
Yes. EUSPA, the new EU Space Programme Agency whose HQ is located in Prague (Czech Republic) has celebrated its one-year anniversary last May. Its mission is to commercialise the space systems, most notably Galileo and Copernicus. It contributes to increase the use of space in a high number of application domains, so greatly contributing to commercialisation of space. We are therefore in close relation, ESA keeping the level of autonomy that is necessary to efficiently develop and implement its programmes.

At the 2022 ESA-EU Space Summit which was held in Toulouse (France) on 16 February 2022, European leaders reaffirmed their strong political support to the three 'accelerators' identified by ESA to address challenges: could we review these three 'accelerators'?
You are right, three 'Accelerators' were identified:
1. Space for '*green future*'. This accelerator aims to use data derived from Earth Observation satellites to help people act to mitigate climate change and to support reaching a carbon-neutral economy by 2050.
2. *Rapid and resilient crisis response*. This accelerator seeks to better use space data, cognitive cloud computing and interconnectivity in space to support the experts in charge of providing the vital responses to crisis on Earth.
3. *Protection of space assets*. This accelerator will contribute to prevent damage to the European space infrastructure and will avoid disruption to its economically vital infrastructures: power supplies, communication links due to space weather conditions, etc.

Those three ESA accelerators fully complement the EU Secure Connectivity Initiative and the EU proposal for Space Traffic Management.
Individual ESA Member States and Associated States will take the lead on one (or more) of these three accelerators.

At this Space Summit, Government Ministers in charge of space mandated you to initiate a discussion on two so-called 'Inspirators': Human exploration and Icy moons, could you say some words about them?
1. Human exploration.
Human exploration is an essential sovereignty capability among all the major space powers in the world except Europe. Is it possible for Europe to remain outside the Great Powers club? To put the question already answers it. This is the reason why a High-Level Advisory Group is being established. It will provide its report end of January,

ahead of the second Space Summit to be held in 2023. I am very happy to accept President Macron's proposal to set up this High-Level Advisory Group on "Human Space Exploration for Europe". Working with this group should help shape what Europe will look like in the decade to come. The advisory group brings together personalities from various disciplines, and mainly from non-space activity domains. We are now in the initial phase. First building blocks will be tabled at the upcoming ESA Council of Ministers, but only preliminary elements of reflection. Things will be much more developed at the time of the 2023 Space Summit which will be attended by Heads of Governments of the 30 countries being members of both EU and ESA.

2. Icy moons.

Minister also expressed their support to increase Europe's ambition in space science through a proposed Inspirator concept of a sample return mission which purpose is to search for extra-terrestrial life on one of the Icy Moons orbiting Jupiter and Saturn.

There is big difference of philosophy between 'Accelerators' and 'Inspirators', what about their compatibility?

The High-Level Advisory Group is conducting its work with the permanent regard for ensuring coherence between Accelerators (short and mid-term objectives) and Inspirators (reflections about long-term exploration programmes). Besides in the end of the 2022 Space Summit, Ministers have acknowledged the coherence and links between both accelerators and inspirators.

Artemis-1 is going to be launched very soon. ESA is playing an important role in this mission, providing to NASA the European Service Module (ESM). I have the impression that this European contribution is unknown to the general public and even to a large part of the aerospace actors. What is your opinion?

I totally agree with you, our ESM contribution is not at all presented by the general media. It is not fully known to the general public. This is all the more unfortunate that this space module is indispensable for the performance of the mission, supplying Orion capsule with absolutely vital elements: power (solar arrays), water, air and electricity. It is to be observed that Artemis is the first NASA-ESA mission where ESA provides services without which it could not be performed. This deserves to be better known and promoted.

How do you plan the European involvement in the future Artemis missions, and more globally how are you conceiving the role of European astronauts in space exploration?

ESA is committed to build the European Service Module for all successive Artemis missions. We already have a commitment to build six ESMs and we already talking about ESMs 7 to 9.

ESA has secured that three European astronaut would fly on board the Orion capsule among the 4-astronaut crew. Currently, we foresee a possibility on Artemis 4 and 5 while the third opportunity is still in negotiation. These three missions should happen before the end of the decade and my strong wish is to have one European astronaut sent to the surface of the Moon in that period.

ESA will participate to the Civil Lunar Gateway according to the terms of the ESA-NASA MoU of October 2020. This agreement states in particular that ESA will receive three opportunities to travel to and work on the Lunar Gateway Furthermore, ESA is convinced that it has to develop an ambition roadmap for Europe's future human space-flight, with fellow European astronauts launched on a European transport system. We support the manifesto presented by the Association of Space Explorers – Europe on the occasion of the European Space Summit held in last February in Toulouse: Here also we have to "accelerate".

Could you say some words as regard the consequences of the Russia–Ukraine crisis on the ESA programmes?

Clearly ESA has interrupted all relations with Russia since the beginning of the war against Ukraine, with the only exception of the ISS missions. Among the difficulties created by this huge crisis, is the ExoMars mission whose launch was programmed to take place in September. We are actively seeking alternative backup solutions.

Could you say some words about Webb?

NASA has really been impressed by the very successful launch by our Ariane 5 of the Webb Space Telescope on 25 December last year, allowing an extremely accurate trajectory. Now data are being exploited by astrophysics researchers all over the world and 30% of them are European. It is a great satisfaction to see this high level of Europe's presence in the Universe Sciences field.

The 2022 ESA Minister Council is approching : what are your main hopes and expectations ?

This ESA Council (Paris, next November) – CM22 – will be a time for critical decisions. ESA's Member States, Associated States and Cooperating States will have together to strengthen Europe's space sector and ensure it serves more and more our citizens:

- The funding of a well-balanced package of Programmes in November 2022 and the approval of the seeds for the accelerators and inspirations which will be tabled at the next ministerial meeting in 2025;
- To be recognised again that space activity is essential to highly contribute to tackling the urgent unprecedented societal, economic and security challenges, from climate change causing floods and fires, to cyber attacks on our vital infrastructures;
- To be recognised the importance of space for people and the necessity to develop applications of space in more and more domains:
- A positive decision regarding an ambitious package

called Terrae Novae for Human and Robotic Exploration giving the impulse to the Inspirator 'Human Space Exploration' with a view to joining in this decade the club of great space nations through developing Europe's sovereignty capability for human space exploration.

To conclude our conversation, my thought is structured around three key words: autonomy, leadership and responsibility:

- *Autonomy:* the present geopolitical crisis and climate change demand that we increase our autonomy, which in particular needs to invest in space.
- *Leadership:* Europe has to join in this decade the club of great space nations;
- *Responsibility:* as regard climate change, space means need to be more and more developed in order to eminently contribute to face this terrible challenge.

Space for a Green Future

Rapid and Resilient Crisis Response

Protection of Space Assets

51ST TRUSTEES BOARD MEETING OF THE COUNCIL OF EUROPEAN AEROSPACE SOCIETIES

HELD HYBRID ON TUESDAY 14TH OF JUNE 2022

MESSAGE FROM ANDREA ALAIMO, DIRECTOR GENERAL OF CEAS

It's a great pleasure to introduce a summary of the minutes of the 51st Board of Trustees meeting, held in Madrid the 14th of June 2022 , as it highlights the intense activities of CEAS during the pandemic. Despite the difficulties associated with covid 19, CEAS has pursued its planned objectives mainly related to the support and organization of scientific Conferences, to the improvement of international cooperation and to the constant increase in the quality and ranking if its journals. In this context are noteworthy the organization of the 2nd CEAS Woman in Aerospace Conference, the organization of two joint sessions on "Future Air Mobility" and "Technology for Space Utilization and Exploration" at KSAS 2022 Conference, to be held on 16-18 November 2022, and the organization of the Aerospace Europe Conference 2023 subtitled Joint 10th EUCASS & 9th CEAS Conference, to be held on July 2023. Another important goal is represented by the MoU signed between CEAS and Pegasus Network. The main aim of the Pegasus Network is the partnership of the best European aerospace universities with currently 28 members in 11 different European countries and thus the signed MoU will certainly favour the diffusion of CEAS among young aerospace engineering students.

This is just an overview on the content of the minutes and I invite you to read the document to better go inside the life of CEAS.

ATTENDEES

AIDAA, Franco Bernelli Zazzera (President) **– 3AF,** Pierre Bescond (VP External Relations & Publications**) – AIAE,** Arturo de Vicente **– AIDAA,** Andrea Alaimo (Director General) **– AIDAA,** Carlo Bettanini (online) **AIDAA,** Sergio De Rosa (online) **– CzAeS,** Daniel Hanus **– DGLR,** Cornelia Hillenherms (VP Finance) **– DGLR,** Andrea Diebal (online) **– FTF,** Anders Blom (online) **– FTF,** Petter Krus (online) **– NVvL,** Fred Abbink (online) **– PSAA,** Lukasz Kiszkowiak (online) **– PSAA,** Tomasz Goetzendorf-Grabowski **– RAeS,** Jonathan Cooper Head of the aeronautical Branch **– SVFW,** Georges Bridel (online) **– EUROAVIA,** Victoria Prieto (online) **– CEAS** Thomas Vermin (CEAS Web Site Manager) **– CEAS,** Beata Wierzbinska-Prus (CEAS Secretary) **– CEAS,** Wilhelm Kordulla (online)

Special guests
Politecnico di Milano, Masarati Pierangelo (CEAS Rotorcraft Technical Committee)
PEGASUS, Gustavo Alonso

WELCOME

Welcome, Confirmation of Quorum and Agenda
Mr Bernelli opened the 51st Board of Trustees and welcomed all the participants. Heintroduced Mr Gustavo Alonso, the President of PEGASUS, who was a special guest of the meeting, and informed about signing of the MoU between CEAS and PEGASUS.

REPORT ON AEC2021

Mr Grabowski presented a short report on AEC20211, underlining that it was the first CEAS hybrid conference.
Firstly, he presented some general statistics: during AEC 2021, 107 abstracts were accepted, and 87 presentations were submitted and presented. 45 were presented online and 42 were presented onsite.
The conference consisted of 22 sessions: 9 full on-site, 10 full on-line, 3 mixed and 5 plenary lectures.
Presentations were divided into 4 groups according to the topics listed below:
- **Group 1** – traditional topics (Aircraft design, Aeronautics, Dynamics, Material & Structures, Flight dynamics);
- **Group 2** – UAV as a separate group being the most popular theme;
- **Group 3** – Space;
- **Group 4** – Skills for aerospace.

Mr Grabowski shortly reported the submission of the papers to the Journals after the Conference:
- 23 papers were invited to CEAS Aeronautical Journal (10 (+2) submitted and 1 accepted);
- 8 (9) invited, 4 submitted to CEAS Space Journal. All are still under review;
- 31 invited, 13 submitted, 5 "in print", 2 almost accepted and 6 under review to Transactions on Aerospace Research.

Mr Grabowski underlined that despite AEC2021 was still held in the pandemic reality, it was organized successfully.

CEAS PUBLICATIONS

CEAS JOURNALS
Ms Hillenherms presented the CEAS Aeronautical Journal and the CEAS Space Journal, reminding that both CEAS Journals were created under the umbrella of CEAS, supported by the German Aerospace Centre (DLR) on

the one hand and the European Space Agency (ESA) on the other, and that they are published by Springer Nature.since 2011.

THE EDITORIAL BOARDS
CEAS Aeronautical Journal
Editor-in-Chief: Markus Fischer, DLR, Cologne. Managing Editors: Cornelia Hillenherms, DLR, Cologne and Andrea Dieball, DLR, Cologne

CEAS Space Journal
Editor-in-Chief: Hansjörg Dittus, Bremen. Managing Editors: Wilhelm Kordulla - CEAS, Johan Steelant - ESA and Stefan Leuko – DLR
Ms Hillenherms reported the statistics of all paper submissions within the last 5 years, also divided by countries. Mr Bernelli underlined that CEAS Journals are improving on the basis of the submitted presentations.
Ms Hillenherms and Mr Bernelli asked CEAS Full Member Societies to actively promote CEAS Journals in their own countries.

Proposal for associated editors, especially in the topics of Propulsion, Unmanned Air Vehicles & Systems, Urban Air Mobility and Sustainable aviation
Mr Bernelli thanked Ms Hillenherms for her presentation and asked Mr Masarati to give a presentation on the Rotorcraft Committee.
Mr Masarati presented shortly the history of the European Rotorcraft Forum (ERF) and reminded that first edition was organized in 1975 in Southhampton. Until now, there have been 47 editions and this year the 48th ERF will take place for the first time in Winterthur, Switzerland, from 6th to 8th September 2022. The ERF is organised by the Centre of for Aviation (ZAV) of the ZHAW Zurich University of Applied Sciences, under the auspices of the Swiss Association of Aeronautical Sciences (SVFW). Its chairman will be Mr Pierluigi Capone. 130 abstracts have been submitted, 120 abstracts have been accepted.

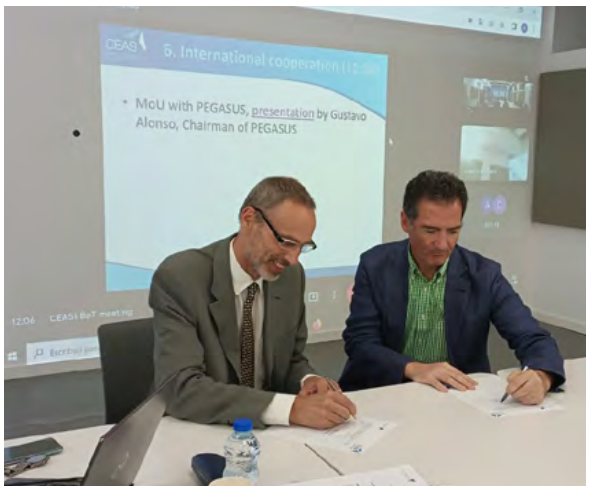
In the future, the next ERFs are planned accordingly:
49th in 2023 Germany, 50th in France and 51st in Italy.
With regard to the publications after the ERF, Mr Masarati underlined a problem with the proceedings which are not indexed in the SCOPUS and, as the ERF is not a legal body, it cannot register ISSN. Mr Masarati proposed to register CEAS as a legal body and in future ERF could be treated as CEAS conferences.

CEAS Bulletin AEROSPACE EUROPE
Mr Bernelli reminded about the issue from the 49th BoT regarding the candidates for the Editorial Board and asked for any recommendations to complete the structure, not necessarily from the Board of CEAS but also from among the members of the CEAS societies.
Editor-in-Chief: Jean-Pierre Sanfourche
Deputy Editor-in-Chief: Pierre Bescond

Responsible for Headings
Life of CEAS: Andrea Alaimo
CEAS Journal: Cornelia Hillenherms
Civil Aviation Operations: in course of designation
Aeronautical technology: Jonathan Cooper
Artificial Intelligence in Aerospace: Thomas Vermin
Aerospace Defence and Security: in course of designation
Civil Space: Britta Schade
Education & Training Professionals: Franco Bernelli

With the intention to dedicate more space to the Life of CEAS, as of now, in each issue, there will be one paper from a Full Member society as well as one paper from the other partners (Corporate, MoU, ECaero 2)

INTERNATIONAL COOPERATION
Mr Bernelli welcomed Mr Gustavo Alonso, the President of PEGASUS Network, and asked him to give a short presentation. PEGASUS was created in 1978 to foster cooperation among universities and with industry on all areas related to higher education in aerospace. PEGASUS focuses especially on the second level of studies. Mr Alonso presented the aims of PEGASUS which is the partnership of the best European aerospace universities with currently 28 members in 11 different European countries. PEGASUS partners include entities from France, Italy, Czech Republic, Germany, Portugal, UK, Netherlands, Sweden, Spain, Poland and Slovakia.
The main goals of the PEGASUS Network are: a quality system for the higher education, the needs of aerospace industry, cooperation between partners and European research agencies as well attracting non-European students and engineers.
Mr Alonso emphasized the positive aspects for the future cooperation with CEAS: organisation of workshops and conferences, publication of papers in the CEAS bulletin, and promotion of the CEAS Journals among scientists and students.
After the presentation, the MoU between CEAS, represented by Mr Franco Bernelli, and PEGASUS, represented by Mr Gustavo Alonso was signed.



CEAS ORGANISATION

• **Strategy and objectives**

Mr Bernelli pointed out two actions which should be implemented. One is organizing the joint conference with EUCASS and the other action is a joint session during the conference organized in November by the Korean society.

He reminded about the idea of sharing the information on the events and webinars, especially on the webinars organized in English. Mr Cooper suggested adding the list of planned webinars to the CEAS Bulletin.

Mr Vermin proposed to place this information on the CEAS website and also to share it on the CEAS LinkedIn profile. Mr Bernelli agreed on the idea to insert it under the "Events" or create a separate item "Webinars".

Mr Bernelli proposed opening the standing action for this, as both need to be updated periodically.

AWARDS

Mr Bernelli gave a short introduction reminding everyone about a call for nominations and informed that he has received two nominations for the Gold Award, received no nominations for the Distinguished Service Award, additionally he received a list of five papers from each CEAS Journal for most cited paper award. Mr Bernelli informed that the Evaluation Committee reviewed the nominations and made the proposal which was sent to the BoT as a preparatory document. Mr Bernelli asked Mr Bloom to present the outcome of the evaluation committee.

Mr Bloom informed that proposals were sent to the Award subcommittee and these are: CEAS President Franco Bernelli, CEAS Director General Mr Andrea Alaimo, Mr Anders Blom CEAS Award Vice-president and Committee chair and past CEAS Presidents Mr Fred Abbink and Mr Zdobyslaw Goraj.

• **CEAS Gold Award 2022**

Mr Blom informed that the Committee received two proposals and, after a deep evaluation of the profiles of the candidates, unanimously decided to recommend Professor Johann Dietrich-Wörner for the Gold Medal Award nominated by the Royal Aeronautical Society - RAeS with a support letter from The Netherlands Association of Aeronautical Engineers NVvL.

• **CEAS Distinguished Service Award 2022**

Mr Blom presented the proposal of the German Society for Aeronautics and Astronautics (DGLR) with the second nomination for the Gold Medal Award and informed that the Committee recommended the nomination of Mr Dietrich Knörzer for the CEAS Distinguished Service Award.

• **CEAS Journals Most Cited Papers Award 2022**

Mr Blom informed that the Committee proceeded with the CEAS Most Citied Papers Awards and after the analysis of the citation report and taking into account the publication year, the committee recommended three articles for each of the respective Journals.

CEAS Aeronautical Journal Most Cited Paper Award:

1. R. Merino-Martínez, P. Sijtsma, M. Snellen, T. Ahlefeldt, J. Antoni, C. J. Bahr, D. Blacodon, D. Ernst, A. Finez, S. Funke, T. F. Geyer, S. Haxter, G. Herold, X. Huang, W. M. Humphreys, Q. Leclère, A. Malgoezar, U. Michel, T. Padois, A. Pereira, C. Picard, E. Sarradj, H. Siller, D. G. Simons, C. Speh, 2019. "A review of acoustic imaging methods using phased microphone arrays: Part of the "Aircraft Noise Generation and Assessment" Special Issue. CEAS Aeronautical Journal, 10(1), pp. 197-230,
2. C. M. Liersch, M. Hepperle, 2011. "A distributed toolbox for multidisciplinary preliminary aircraft design". CEAS Aeronautical Journal, 2 (1-4), pp. 57-68
3. M. G. Ostergaard, A. R. Ibbotson, O. Le Roux, A. M. Prior., 2011. "Virtual testing of aircraft structures". CEAS Aeronautical Journal, 1 (1-4), pp. 83-103

CEAS Space Journal Most Cited Paper Award

1. J. Santiago-Prowald, H. Baier; "Advances in deployable structures and surfaces for large apertures in space". CEAS Space Journal, 2013, Vol. 5, No. 3-4, pp.89
2. M. Schneider, c. Hartwanger, H. Wolf; "Antennas for multiple spot beam satellites." CEAS Space Journal, 2011, Vol. 2, No. 1-4, pp. 59
3. S. Evans, W. Taber, T. Drain, J. Smith, H. C. Wu, M. Guevara, R. Sunseri, J. Evans; "MONTE: the next generation of mission design and navigation software." CEAS Space Journal, 2018, Vol. 10, No. 1, pp. 79

Mr Bernelli summarized the CEAS Awards and asked if anyone is against. Among on-line participants no one was against, on-site one vote against. The awards will be delivered next year during the AEC2023.

PRESENTATION OF CEAS TECHNICAL COMMITTEE

Mr Cooper reported on the activity of the Aeronautical branch, reminded about the most important conferences held in the nearest future. He summarised his speeches and the activity during the IFASD 2022 Conference.

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CONFERENCES

• **Joint sessions at KSAS 2022 Conference**

Mr Bernelli reminded about the Event organized by the Korean Society KSAS which will be held on 16-18th of November 2022 in Jeju, Korea. Two joint sessions are planned to be organized. The first one will be the "**Future Air Mobility**" and the second one "Technology for Space Utilization and Exploration". Mr Bernelli reminded about the idea to identify 2-3 speakers for each topic, proposed one Speaker for session 2 and asked to propose other speakers. He said that Ms Schade should provide one name for the second session.

Future Air Mobility (suggestions to be confirmed)
Speaker 1: DLR (C. Hillenherms)
Speaker 2: EUROCONTROL (M. Bourgois)
Speaker 3: Volocopter (C. Hillenherms , T. Vermin)

Technology for Space Utilization and Exploration (suggestions to be confirmed)
Speaker 1: Francesco Topputo (AIDAA)
Speaker 2: ESA (B. Schade)
Speaker 3: Open Cosmos (T. Vermin)

• AEC 2023 Conference
Mr Bernelli reminded that during the last BoT in April it was agreed to organize AEC 2023 as a joint Conference with EUCASS and he informed that on the 3rd of June the meeting between CEAS (Mr Bernelli and Mr Besond) with EUCASS (Mr Bonnal and Mr Merlenn) was held. Mr Bernelli reported on the meeting. EUCASS has received a proposal from the convention centre in Lausanne, Switzerland, to organize the Event in first week of July, 3 to 7 July 2023. The name of this Conference was proposed as: **AEC2023 – Aerospace Europe Conference 2023 – Joint 10th EUCASS and 9th CEAS Conference.**

Organizing a joint conference means wider participation and also increased engagement of the local society – Swiss society by delegating someone from SVFW to sit in a local committee. Plenary lectures are divided into 2 topics: Aerospace could be provided by SVFW and Space could be provided by EPFL. Other plenary sessions will be agreed within CEAS-EUCASS committee.
Mr Bernelli underlined that the technical committee must be established and the topics of the conference must be identified. He asked Mr Grabowski to send him the list of Topics from AEC 2021 and also the list of Programme committee members.

FINANCES

Mr Bernelli informed that he asked EUCASS for a reduced registration fee for CEAS Members. It was agreed that CEAS will support the organization of the conference financially and the extra profit from the Conference will be shared 50/50. He mentioned that it would be good to visit the Congress centre in Fall 2022, after receiving the updated proposal for joint organization of EUCASS and CEAS.

AMONG OTHER VARIOUS ITEMS

• WEC 2023
Mr Bernelli informed about the conference which will be organized next year in Prague by the Czech Aerospace Society CzAeS. Mr Bernelii was asked to sit in a Programme Committee and underlined that the WEC Conference does not have official journals for publications and will rely on the offered journals. Mr Bernelli would like to propose both CEAS journals, one for the "Green Transport" and the other one for the "From Earth to the Universe". Mr Bernelli asked Mr Hanus to say a few words about the upcoming WEC conference.
Mr Hanus presented the information on the 7th World Engineers Convention 2023 which will take place in Prague, between 9 – 15 October 2023. It will be hosted by The Czech Association of Scientific and Technical Societies (CSVTS) in cooperation with the World Federation of Engineering Organizations (WFEO), with CEAS recommendation. The theme of WEC 2023 responds to the current planetary challenges and reflects the main goal which is to explore and find how high-tech, as well as low-tech innovations, artificial intelligence and a transdisciplinary approach, can ensure environmental sustainability and assure a safer future. Mr Hanus informed that the call for abstracts is open to submit in 14 topics. Mr Bernelli thanked Mr Hanus for the presentation.

• Patronage
Mr Bernelli informed that CEAS has received a request from Telespazio, an Italian Company owned by Leonardo and Thales, to receive patronage for the Open Innovation Contest called T-Tec Telespazio Technology Contest which is opened for students and researchers from universities from all over the world. If there are no objections to such an activity from the Board, Mr Bernelli will proceed with the action.

- **Future Board of Trustees meetings and Board of Officers meetings**
  – 52nd BoT Meeting washeld during ICAS 2022 in Stockholm, Sweden, on 6th of September
  – 53rd GA & BoT Meeting is planned 23rd of November at ESA/ESTEC

CEAS Council of European Aerospace Societies

eucass

FROM THE COIAE – IN LAST FEBRUARY TOOK PLACE IN MADRID A CONFERENCE ORGANISED BY COIAE: THE PATH OF AVIATION INDUSTRY TOWARDS ENVIRONMENTAL SUSTAINABILITY

By Arturo de Vicente, President of AIAE-DS and CEAS Trustee

SOME INTRODUCTORY WORDS: THE DISTINCTION BETWEEN AIAE AND COIAE

• AIAE

The AIAE, Asociación de Ingenieros Aeronáuticos de España, is a private-law entity that was created in 1928. This organization represented Spanish aeronautical engineers until 1965, the year in which the Colegio Oficial de Ingenieros Aeronáuticos de España (COIAE) was created, which in accordance with the Law of Professional Associations assumed the official representation of Spanish aeronautical engineers.

The main purposes and functions of the AIAE are to promote bonds of union and fellowship among aeronautical engineers, contribute to the development of aeronautics, being a consultation center for the Administration and establish the closest and most cordial relationship with engineering associations and corporations that may exist, both in Spain and abroad, being able to join the coalition organizations that comprise them.

The Association of Aeronautical Engineers of Spain is part of the Spanish Institute of Engineering as a founding member, along with the rest of the associations of the different engineering branches. It is also a member of the Council of European Aerospace Societies (CEAS) through which aeronautical engineers maintain their representation in Europe.

• COIAE

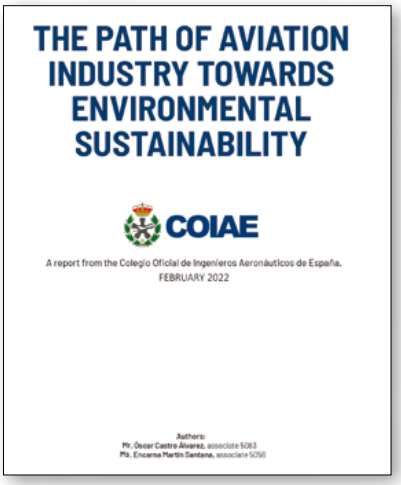
The COIAE, Colegio Oficial de Ingenieros Aeronáuticos de España, was created by Decree 928/1965, of April 8, under the Ministry of the Air.

Currently, the COIAE is a Corporation of Public Law, of national coverage, relating to the Administration through the Ministry of Public Works.

The essential purposes of the COIAE are the organization under a regime of free competition for the exercise of the profession of Aeronautical Engineer, the exclusive representation of the same, the defense of the professional interests of the members and advice to society and public authorities on the development of the Spanish aeronautical sector.

The main functions of the COIAE are to hold the representation and defense of the profession before the Administration, institutions, courts, entities and individuals; endorse professional jobs; order the professional activity of members; promote the creation of entities that tend directly to the promotion, development of the aeronautical sector and defense of the rights or interests of the profession of Aeronautical Engineer; collaborate with the Administration by carrying out studies, reports, opinions, expert opinions, preparation of statistics and other activities related to its purposes, which may be requested or agreed to formulate on its own initiative.

THE PATH OF AVIATION INDUSTRY TOWARDS ENVIRONMENTAL SUSTAINABILITY



Here below is published the Executive Summary of this Conference

FOREWORD

During year 2020, the COIAE published its first report on the aeronautical sector's sustainability. Our entity, like the entire sector, are very committed to the environmental issues and therefore, we are betting for a sustainable growth of the sector. What's more, this sector has shown with data

and facts that it grows in a sustainable way, something that has been shown by the reduction of CO_2 emissions in recent years, or the research on the future use of hydrogen, among many other examples.
Since then, and as we had already announced, initiatives of all kinds to get closer and closer to sustainable aviation have not stopped multiplying (manufacturers, operators, airport and navigation companies, engineering companies ...). Given the acceptance of the first report and with the aim of updating the scientific data, the proposals to be made and the technological developments, the COIAE has decided to issue this second edition.

Receive my cordial greetings,
Estefanía Matesanz
Dean of Colegio Oficial de Ingenieros Aeronáuticos de España

EXECUTIVE SUMMARY

- The main objective of this report is to provide reliable information and to review the firm commitment of the aeronautical sector with the environment, which translates into being one of the sectors with more initiatives in progress to minimize its environmental impact.
- Noise mitigation and the reduction of pollutant emissions, both locally at the airports and those inducing global warming, are the main challenges to achieve an environmentally sustainable aviation industry. Minimizing the emission of carbon dioxide (CO_2) is the main objective in this effort, although other elements must also be considered, including nitrogen oxides (NOx) or the formation of condensation trails (contrails) and aviation-induced cloudiness (AIC). In 2018, the commercial aviation industry was responsible for 2.4% of CO_2 emissions globally.
- The COVID19 pandemic, which has hit society hard on a global scale, has also had a major impact on the commercial aviation industry, with long-term consequences on air traffic and a temporary reduction in its emissions.
- Despite its lower global emissions compared to other transport sectors, commercial aviation led the way in 2008 by launching a coordinated plan to address climate change with clearly established milestones:

energy efficiency improvements of 1.5% per year until 2020, CO_2 neutral growth from that same year, and 50% reduction of total net emissions by 2050..

- This effort has been reinforced in recent years with additional commitments as the complete decarbonisation by 2050 pledged by the aeronautical industry in Europe, an objective increasingly assumed by many other companies and entities in the sector.
- In order to meet these ambitious goals, the aviation sector is investing considerable resources in multiple actions, covering emissions offset, improving operations or research and development of new technologies to reduce noise and emissions. In the last four decades, the energy efficiency improvement of commercial aircraft has been above 60%. A state-of-the-art aircraft consumes an average of 3 litres of fuel per 100 passenger-km. This value, and therefore the associated CO_2 emissions, is similar to the performance of an efficient compact car.
- The European Emissions Trading System (EU ETS) certified the reduction of 193 million tons of carbon dioxide emissions related to air traffic between 2013 and 2020. At a global level, in January 2021 went into operation the first phase of CORSIA, a regulatory framework to compensate CO_2 emissions from international civil aviation. Also this year, the European Commission has proposed the coordination of these two CO_2 emission control schemes, as well as the reinforcement of the reductions within the EU ETS.
- The improvement of infrastructures and control systems, both in flight and at the airports, allows for a more efficient coordination and management of air traffic, and the corresponding reduction of emissions and noise. In Europe, it is worth mentioning examples such as the Single European Sky (SES), and its technological branch SESAR, set to develop and implement the future common air traffic management system.
- The continuous technological development applied to aircraft, with gradual improvements in the propulsion systems (for example, increasing the bypass ratio), new materials (e.g. advanced composites) and aerodynamic innovations (among others, aiming for laminar flow) allows to design more efficient and increasingly less polluting aircraft. In the longer term, disruptive designs including, for example, counterrotating open rotor engines, truss-braced wings or blended wing bodies will lead to even more significant improvements.
- Sustainable aviation fuels (SAF), from biological or synthetic renewable sources, are already a reality and open a viable option, in the short to medium term, to effectively reduce the environmental impact of aviation. Although aimed mainly to tackle CO_2 emissions, they also have the potential to mitigate other negative effects such as contrails. Their great advantage is that they can improve the sustainability of existing aircraft (drop-in concept), including those that operate long-haul, high-capacity flights. To calculate its environmental efficiency, its entire life cycle must be taken into account, including the direct and indirect impacts due to its production. The recent legislative initiative of the European Commission, Fit for 55, includes a SAF refuelling mandate and could provide the momentum needed for its widespread use.
- Commercial aviation using electric propulsion, which is expected to enter into service for regional aircraft during this decade, is yet the only way to perform flights with zero environmental impact, assuming the use of renewable energy and equipment.
- Electric engines allow for diverse and flexible configurations, with multiple hybrid options to optimize the performance. The electric power can be delivered by

batteries or fuel cells. The electric propulsion opens up new possibilities and advantages in aircraft design (e.g. lower induced drag, boundary layer intake or distributed engines). The main technological obstacles to overcome are the low specific energy of batteries and the design of high-power electric systems, areas in which progress is being made very quickly.

- The introduction of hydrogen in aviation as a sustainable energy vector is one of the most promising ways to drastically reduce CO_2 emissions. Its application is particularly interesting for the most polluting segment of commercial aviation: aircraft flying around 2,000 km with more than 100 passengers. The industrial development and introduction of hydrogen is strongly promoted by several governments from Japan to Europe, as it is a very versatile element in decarbonization strategies. In the field of aviation, hydrogen plays a key role in the production of synthetic sustainable fuels, it can power electric propulsion via fuel cells, and it can also be burned directly in turbojets. Currently there are several commercial projects underway for its application in all these variants.

- Hydrogen mitigates the range problem of electric propulsion, thanks to a specific energy three times higher than kerosene, thus reducing the weight of fuel required. On the other hand, its energy density is at least four times lower than conventional fossil fuel, which leads to many design challenges due to the bigger space needed to accommodate bulky H2 pressurized or cryogenic tanks. Theoretically, its combustion only produces water as by-product, but more research on its environmental impact is still required as the H2O is released at high altitude (contrails and AIC), as well as continuing technological development to minimize the associated NOx emissions.
- The path to an environmentally sustainable aviation, beyond technological advances, will also require an ambitious regulatory and financing framework to foster the development and implementation of these sustainable solutions, so that they are competitive against fossil fuels.

- Noise due to aircraft, both from air and ground operations, is being continually reduced, with new airplanes displaying a noise footprint 30-50% lower than the previous generation. Nowadays, state-of-the-art aircraft are 75% quieter than 50 years ago.

- Achieving an environmentally sustainable commercial aviation is an ambitious goal, but within our reach. It will require the involvement and effort of the entire aeronautical industry, as well as the support of governments, international organizations and the passengers themselves. There is a wide toolkit of actions, strategies and technologies to achieve this goal, and the most likely path is a combination of all of them according to their optimal capabilities and different timeframes. As an example, in a horizon of 10 to 20 years, it would be feasible to achieve regional and short-range commercial air transport mainly based on electric and hybrid propulsion, with hydrogen combustion engines powering mid-range and highcapacity routes, and long-haul flights relying on sustainable fuels.

To learn more please download: https://drive.google.com/file/d/1YO2zepVyizPnwgzQRxXm75_tLVORDg8r/view?usp=sharing

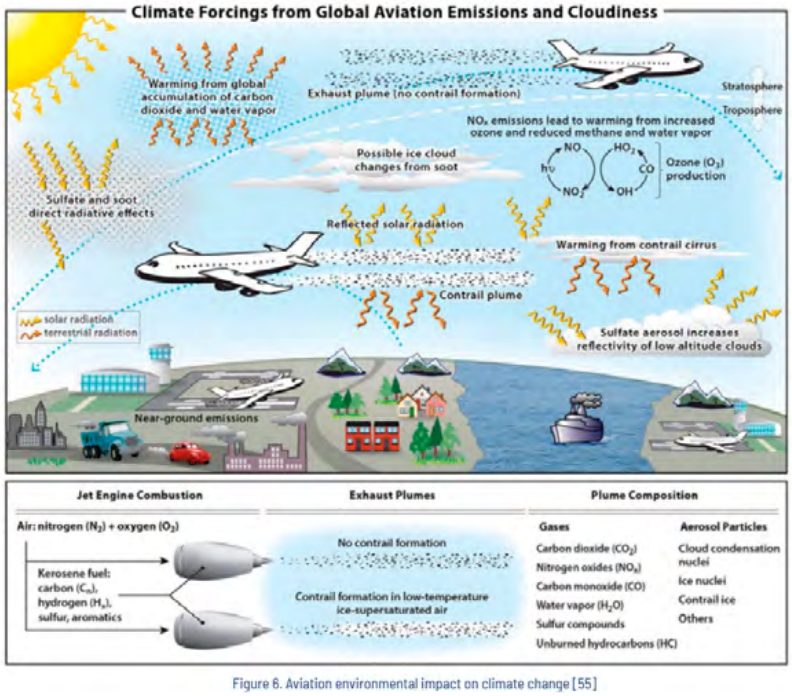


Figure 6. Aviation environmental impact on climate change [55]

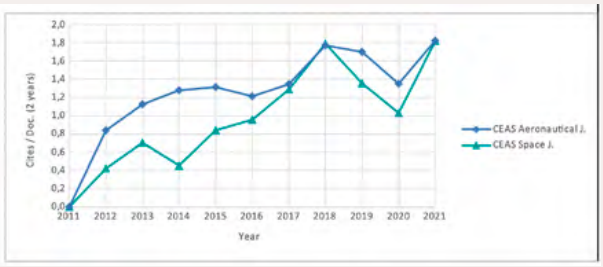
AMONG SUBJECTS DEALT WITH DURING THE CONFERENCE

OUTLINE OF THE LATEST ISSUES OF THE CEAS SPACE JOURNAL AND THE CEAS AERONAUTICAL JOURNAL

The journals were created under the umbrella of the Council of European Aerospace Societies (CEAS) to provide an appropriate platform for excellent scientific publications submitted by scientists and engineers. The German Aerospace Centre (DLR) and the European Space Agency (ESA) support the Journals, which are published by Springer Nature.

The **CEAS Space Journal** is devoted to excellent new developments and results in all areas of space-related science and technology, including important spin-off capabilities and applications as well as ground-based support systems and manufacturing advancements.
The **CEAS Aeronautical Journal** is devoted to publishing new developments and outstanding results in all areas of aeronautics-related science and technology, including design and manufacturing of aircraft, rotorcraft, and unmanned aerial vehicles.
Both journals play an increasingly important role in representing European knowledge in aerospace research. Nevertheless, the biggest challenge is still to attract an acceptable number of high caliber scientists and engineers to submit articles for publication. Therefore, we invite you and your colleagues to contribute to the development of these journals by publishing your hard-earned results. Papers which are considered suitable will be subjected to a comprehensive blind peer-review process for potential publication in the CEAS Journals.
A list of articles published in the latest issues of both CEAS Journals is attached.

The Managing Editors:
– Andrea Dieball
– Cornelia Hillenherms
– Wilhelm Kordulla
– Stefan Leuko
– Johan Steelant



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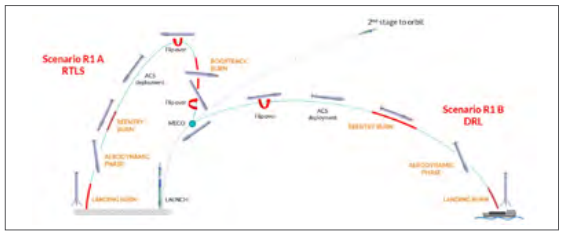
CEAS SPACE JOURNAL

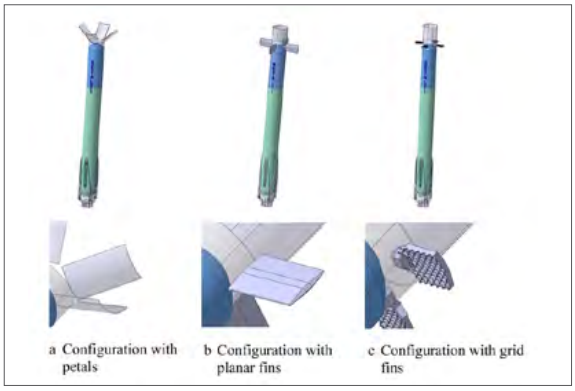
Volume 14, Issue 3, July 2022

RETRO PROPULSION ASSISTED LANDING TECHNOLOGIES: THE RETALT PROJECT
A. Gülhan, A. Marwege & J. Vos/ Published online: 05 July 2022 (Open Access)

RETALT: REVIEW OF TECHNOLOGIES AND OVERVIEW OF DESIGN CHANGES
A. Marwege, A. Gülhan, J. Klevanski, C. Hantz, S. Karl, M. Laureti, G. De Zaiacomo, J. Vos, M. Jevons, C. Thies, A. Krammer, M. Lichtenberger, J. Carvalho & S. Paixão / Published online: 28 June 2022 (Open Access)

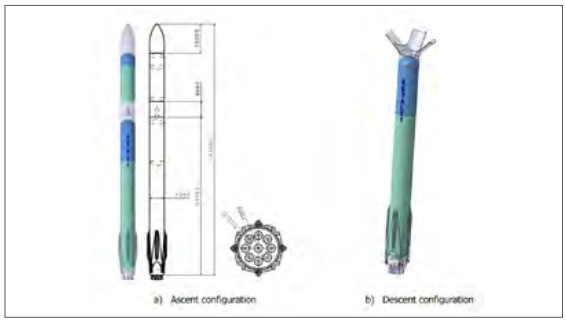


WIND TUNNEL EXPERIMENTS OF INTERSTAGE SEGMENTS USED FOR AERODYNAMIC CONTROL OF RETRO-PROPULSION ASSISTED LANDING VEHICLES
A. Marwege, C. Hantz, D. Kirchheck, J. Klevanski, A. Gülhan & D. Charbonnier /Published online: 21. Februar 2022 (Open Access)



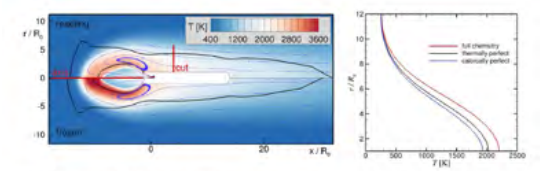
HYPERSONIC RETRO PROPULSION FOR REUSABLE LAUNCH VEHICLES TESTED IN THE H2K WIND TUNNEL

A. Marwege, D. Kirchheck, J. Klevanski & A. Gülhan / Published online: 29 June 2022 (Open Access)



AEROTHERMAL DATABASES AND LOAD PREDICTIONS FOR RETRO PROPULSION-ASSISTED LAUNCH VEHICLES (RETALT)

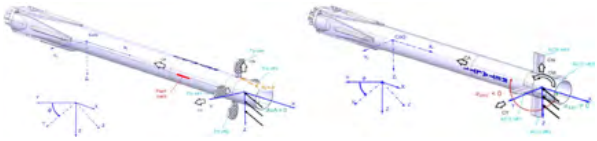
M. Laureti & S. Karl / Published online: 04 January 2022 (Open Access)



(a) Temperature fields in reacting and frozen flow conditions (b) Temperature profiles

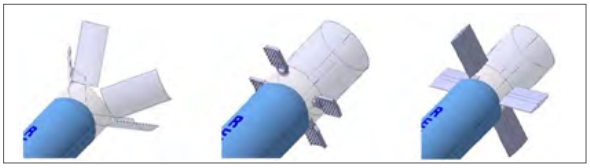
COMPUTATIONAL FLUID DYNAMICS INVESTIGATIONS OF AERODYNAMIC CONTROL SURFACES OF A VERTICAL LANDING CONFIGURATION

D. Charbonnier, J. Vos, A. Marwege & C. Hantz / Published online: 25 March 2022 (Open Access)



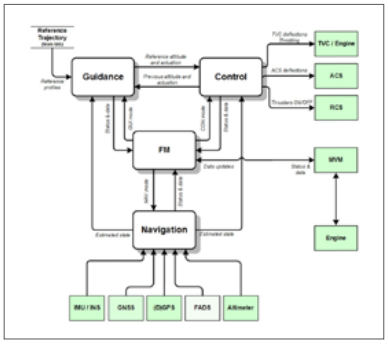
MISSION ENGINEERING FOR THE RETALT VTVL LAUNCHER

G. De Zaiacomo, G. B. Arnao, R. Bunt & D. Bonetti / Published online: 05. July 2021 (Open Access)



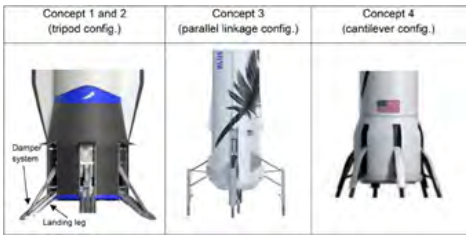
DESIGN OF THE LANDING GUIDANCE FOR THE RETRO-PROPULSIVE VERTICAL LANDING OF A REUSABLE ROCKET STAGE

A. Botelho, M. Martinez, C. Recupero, A. Fabrizi & G. De Zaiacomo /Published online: 17 February 2022 (Open Access)



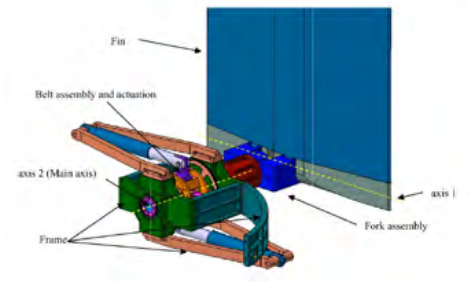
INVESTIGATION OF THE LANDING DYNAMICS OF A REUSABLE LAUNCH VEHICLE AND DERIVATION OF DIMENSION LOADING FOR THE LANDING LEG

C. Thies / Published online: 19 July 2022 (Open Access)



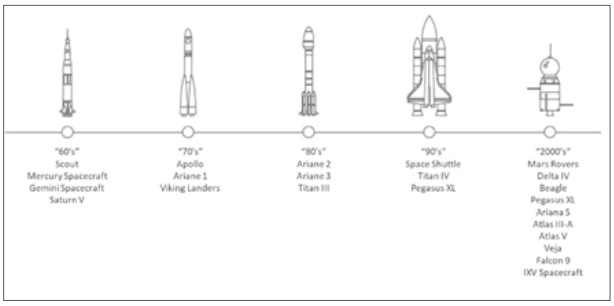
FIN ACTUATION, THRUST VECTOR CONTROL AND LANDING LEG MECHANISMS DESIGN FOR THE RETALT VTVL LAUNCHER

A. Krammer, L. Blecha & M. Lichtenberger / Published online: 13 January 2022 (Open Access)



RETALT_TPS DESIGN AND MANUFACTURING

S. Paixao, C. Peixoto, M. Reinas & J. Carvalho / Published online: 08 January 2022 (Open Access)



CEAS AERONAUTICAL JOURNAL

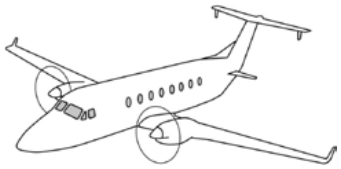
Volume 13, Issue 3, July 2022

MULTIROTOR ELECTRIC AERIAL VEHICLE MODEL IDENTIFICATION WITH FLIGHT DATA WITH CORRECTIONS TO PHYSICS-BASED MODELS

Robert Niemiec, Christina Ivler, Farhan Gandhi & Frank Sanders/ Published: 05 May 2022

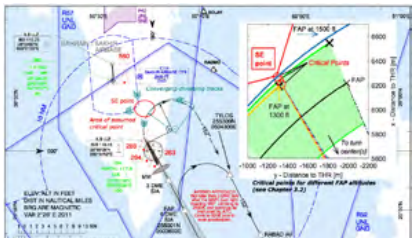
TECHNOLOGY SELECTION FOR HOLISTIC ANALYSIS OF HYBRID-ELECTRIC COMMUTER AIRCRAFT

Clemens Zumegen, Philipp Strathoff, Eike Stumpf, Jasper van Wensveen, Carsten Rischmüller, Mirko Hornung, Ingmar Geiß & Andreas Strohmayer / Published: 11 June 2022 (Open Access), Correction published: 29 July 2022 (Open Access)



DEVELOPMENT AND EVALUATION OF AN RNP AR APPROACH PROCEDURE UNDER TIGHT AIRSPACE CONSTRAINTS

Richard M. Unkelbach & Thomas Dautermann / Published: 07 May 2022 (Open Access)



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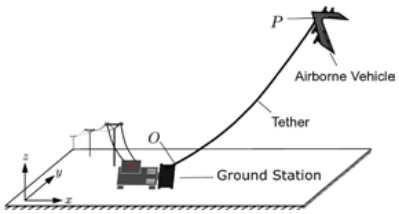
D. F. Duda, H. Fuest, T. Islam, T. Ostermann & D. Moormann / Published: 20 May 2022 (Open Access)



GLOBAL AERO-STRUCTURAL DESIGN OPTIMIZATION OF COMPOSITE WINGS WITH ACTIVE MANOEUVRE LOAD ALLEVIATION

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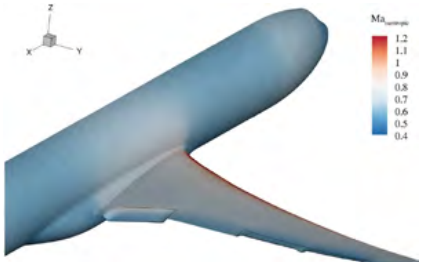
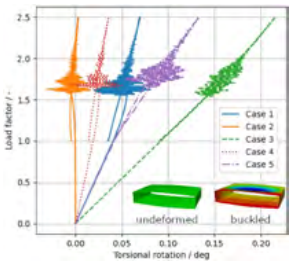


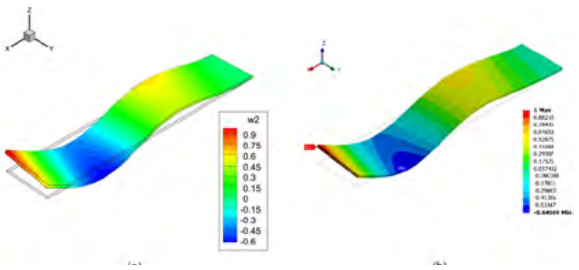
EXPLORATION OF THE EFFECT OF WING COMPONENT POST-BUCKLING ON BENDING-TWIST COUPLING FOR NONLINEAR WING TWIST

Daniel Hahn & Matthias Haupt / Published: 25 May 2022 (Open Access)



DESIGN OF MULTILAYERED VAT PANELS BY MEANS OF HIGHER-ORDER PLATE ELEMENTS

A. Alaimo, G. Mantegna, C. Orlando, D. Tumino & S. Valvano/ Published: 30 May 2022



IMPLEMENTING A SYSTEM ARCHITECTURE MODEL FOR AUTOMATED AIRCRAFT CABIN ASSEMBLY PROCESSES

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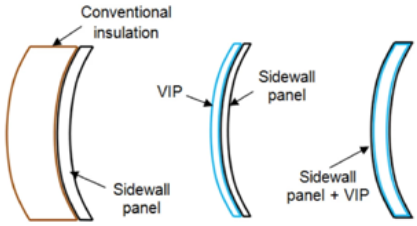
IMPROVING THE THERMAL PROPERTIES OF AIR-CRAFT CABIN INTERIORS WITH THE INTEGRATION OF VACUUM INSULATION PANELS



V. Latsuzbaya, P. Middendorf, D. Völkle & C. Weber / Published: 27 June 2022 (Open Access)

REALISTIC FLIGHT CONDITIONS ON GROUND: NEW RESEARCH FACILITY FOR CABIN VENTILATION

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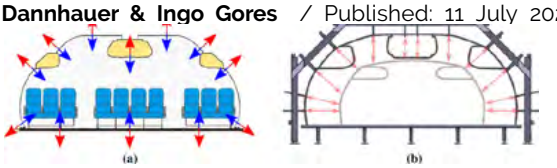
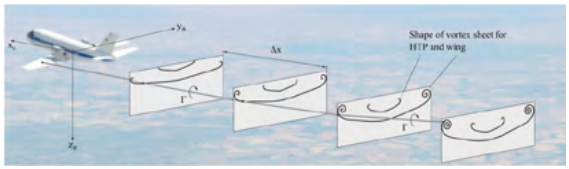


FLIGHT DYNAMICS AND CONTROL ASSESSMENT FOR DIFFERENTIAL THRUST AIRCRAFT IN ENGINE INOPERATIVE CONDITIONS INCLUDING AERO-PROPULSIVE EFFECTS

Maurice F. M. Hoogreef & Johannes S. E. Soikkeli / Published: 27 June 2022 (Open Access)

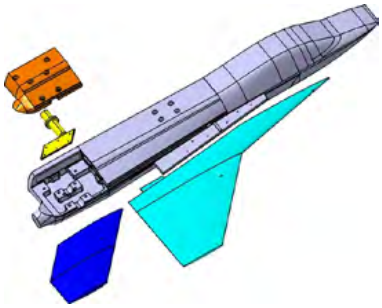
SIMPLIFIED VORTEX METHODS TO MODEL WAKE VORTEX ROLL-UP IN REAL-TIME SIMULATIONS FOR FUEL-SAVING FORMATION FLIGHT

Henrik Spark & Robert Luckner/ Published: 29 June 2022 (Open Access)



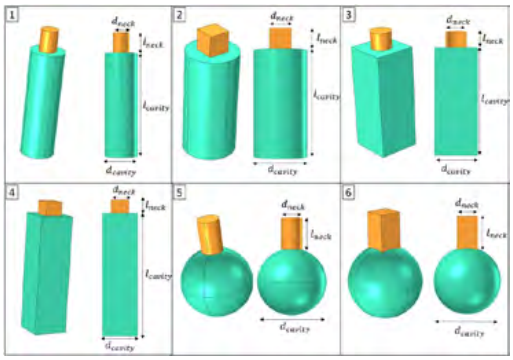
HORIZONTAL TAIL BUFFETING CHARACTERISTICS AT WING VORTEX FLOW IMPACT

Julius Stegmüller, Lukas Katzenmeier & Christian Breitsamter / Published: 11 July 2022 (Open Access)



SEMI-ANALYTICAL ESTIMATION OF HELMHOLTZ RESONATORS' TUNING FREQUENCY FOR SCALABLE NECK-CAVITY GEOMETRIC COUPLING

Giuseppe Catapane, Dario Magliacano, Giuseppe Petrone, Alessandro Casaburo, Francesco Franco & Sergio De Rosa/ Published: 01 July 2022 (Open Access)



INTERVIEW WITH LUC TYTGAT, EASA DIRECTOR, STRATEGY AND SAFETY MANAGEMENT DIRECTORATE

By Jean-Pierre Sanfourche, CEAS, and Markus Fischer, DLR

Luc Tytgat

LUC TYTGAT, EASA

Director, Strategy and Safety Management Directorate

Luc Tytgat is since 1st January 2015 Director of the Strategy and Safety Management Directorate of the European Aviation Safety Agency (EASA).

Luc Tytgat is in charge of raising safety intelligence as one of EASA's key priorities and developing a better and more agile regulatory framework.

His responsibilities also include the key strategic challenges faced by the sector such as sustainable aviation and the emerging risks: cybersecurity, conflict zones, and health and well-being notably COVID 19 related.

Prior to EASA, Luc Tytgat was the Director of the Pan-European Single Sky Directorate at EUROCONTROL since 2011, after having worked for 20 years in the field of air transport and space at the European Commission and 10 years in the Belgian Air Force.

Luc Tytgat has a significant experience when dealing with matters related to the European Commission in, among others, the air transport, Single Sky, and space domains. In this regard, he was responsible for the Single European Sky regulatory package, which led to the creation of the European Network Manager and an economic regulator function for ATM. He also initiated the GALILEO programme and established the EU competence in the space policy sector.

Mr Tytgat, we are very pleased to have this opportunity to exchange with you on the EASA role in Research and Innovation. Would you have a word of introduction for our readers?

It is a great pleasure to present to CEAS Aerospace Europe bulletin's and CEAS Aeronautical Journal's readers the EASA Role in Research and Innovation. As we all know, research and Innovation are key for a competitive EU aviation industry, but they also pose a lot of challenges for EASA as regulator and certifying authority. New concepts and technologies bring new scientific, technical and societal challenges. We need to be an integral part of the technological developments from the very beginning to ensure a high safety level and support the growth of the European industry. Aviation is transforming substantially and faster than ever, and we need our competences to grow as an organisation by participating in research projects and setting up strong partnerships with national regulators, research centres, innovation networks and key players in this dynamic arena.

Photo EASA

What is EASA's role in research and how has it evolved? How are EASA Research & Innovation (R&I) activities coordinated with ACARE, the European Commission (DG MOVE), SESAR, EUROCONTROL, CLEAN AVIATION, and the EASA Member States' National Aviation Authorities?

Regulation (EU) 2018/1139, EASA's Basic Regulation, introduced several new key competences for the Agency. In the field of aviation R&I, and more specifically in the strategic areas of safety, security, environmental protection, and more recently, health safety, EASA assists the Commission and the Member States in identifying main research themes, contributing to ensure consistency and coordination between publicly funded research and development. We support the Commission in the definition and accomplishment of the relevant European Union framework programmes for R&I activities and of the annual and multi-annual work programmes, such as Horizon Europe.

Furthermore, as of earlier this year, EASA participates in the new European Public-Private Partnerships Clean Aviation and SESAR 3 Joint Undertakings, providing advice as third party. We dedicate resources to manage numerous delegated budgets and R&I projects under Contribution Agreements with the Commission. We provide technical advice to innovative industry projects carried out through Innovation Partnership Contracts and we assist in submitting solid proposals. With the Member States, we have set up an Advisory Body dedicated to Research and Innovation with a view to developing joint research agendas. We started last year to engage with academia to create the EASA Scientific Commit-

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tee for sharing and discussing knowledge of advanced scientific developments and have launched a scheme to attract PhD students to share their work with us. The first event related to this activity is planned for March 2023.

EASA is also actively involved in preparing tomorrow's rules and guidance to accompany the emergence of new technologies in aviation. One noticeable effort is linked to the rapid deployment of Artificial Intelligence (AI) solutions in safety-related applications across all aviation domains. The EASA AI Roadmap represents an action plan involving all impacted aviation stakeholders. Close cooperation with EUROCONTROL on the selection and development of use cases in the ATM domain provides EASA with means to test the guidance that is currently developed in the Roadmap deliverables (for more information refer to https://easa.europa.eu/ai).

Finally, EASA is supporting the development of medium and long-term R&I agendas for aviation and air transport through its participation in the Advisory Council for Aviation Research and Innovation in Europe (ACARE), a forum which provides the framework to consolidate the varying needs and perspectives for Research and Innovation activities.

The innovative concepts of future aircraft (H2 propulsion, electric engines, airframe design, aerodynamics, etc.) and the expected proliferation of new airborne vehicles (drones, eVTOL vehicles, etc.) imperatively raises the need for a more agile regulation framework: regulatory updates, innovations in the field of certification. How is EASA approaching this challenge?

EASA faces new societal, environmental, and technological transformations. New technologies, trends and concepts are emerging at an unprecedented pace. This requires adapting competencies, methodologies and processes to accompany those transformations. As innovations and developments aren't often aligned with existing rules, rules need to evolve to enable innovation without compromising on safety. In an environment where innovation develops rapidly, we must evolve from a classical prescriptive mindset to a more performance-based approach, often based on disruptive Concepts of Operations.

Here is an example: the European and national R&I programmes, Clean Aviation and SESAR 3 are developing new aviation concepts and solutions for green technologies and sustainable fuels, which will need to be certified or approved prior to entering operation in Europe and in third countries. Furthermore, new entrants, particularly in the drones' sector, bring new design and operational concepts to the European aeronautics arena, which necessitate new European regulatory responses. To this end the Agency also promotes innovation partnership contracts with industry. These offer a unique opportunity to learn from each other by developing common knowledge that will ease future regulatory developments while de-risking industry disruptive concepts and offering suitable certification or approval bases.

In line with its safety and environmental protection missions, EASA supports and fosters research and innovation to remain at the forefront of conceptual and technological developments and play a leading role in R&I. This includes launching and funding research projects and keeping ties with academia and institutions which can support the Agency in facing new challenges and accompanying transformations.

How is that organised?
The EASA Research and Innovation Committee (RIC) is responsible for steering the Agency in these domains. The Committee is composed of representatives from senior management of strategic and operational Directorates. The Committee has a key role as decision-making body to achieve the following four strategic objectives:

- Build a strong partnership with key players in R&I to facilitate the introduction of new technologies and innovation;
- Provide an agile and effective regulatory system for smooth and timely integration of new technologies and innovative operations;
- Strengthen the Agency's capacity to certify new technologies and effectively oversee innovative operation and new business models; and
- Accompany research and innovation developments through forward-looking competency management by Human Resources.

Within these parameters, the RIC engages in planning actions to reach specific objectives, oversees the Agency's involvement in EU R&I programmes and the related partnerships with stakeholders.

Besides this, our recently established Scientific Committee supports the Agency evolution by providing technical and scientific advice on challenges faced by the aviation community with the advent of new and disruptive technologies and concepts like eVTOLs, drones, U-Space, batteries and Hydrogen electrical propulsion, and related societal transformation.

Research actions are an integral part of the European Plan for Aviation Safety (EPAS https://www.easa.europa.eu/domains/safety-management/european-plan-aviation-safety).

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In conclusion, what is your general feeling about the evolution of R&I and safety in aviation within the next decade?
Research and Innovation is part of aviation's DNA. No industry has been so closely tied to the concept of innovation since its inception than aviation.

EASA manages and participates in a growing number of R&I projects to continuously improve aviation safety, but within the next decade the safety of aviation cannot be disconnected from security, health, and environmental protection. The challenge is to have an integrated approach, support technological developments and remove bottlenecks through adapting the regulatory framework without compromising safety.

Our growing role in research offers huge opportunities for both the Agency and our stakeholders, including States and Industry, to be ready for the future while increasing the high level of safety reached by the aviation system.
Research and Innovation is an investment in our future. EASA is fully engaged in making not only the future of aviation but also the future of our society smarter and more sustainable, to continue creating growth, wellbeing and jobs.

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U-SPACE SEPARATION IN EUROPE – USEPE

The integration of drones expected to enter the airspace is one of the most revolutionary events for air traffic management since the beginning of its implementation. Drones will fly at very-low level (VLL) altitudes, surrounded by infrastructure, near hospitals and densely populated areas, experiencing local weather conditions like turbulent winds.

Researchers in the SESAR U-space USEPE project are investigating solutions to ensure safe separation between these vehicles at all times.

HOW DOES USEPE TO MANAGE DRONE SEPARATION?

After having reviewed existing separation methods and assessed whether they met drone stakeholders requirements, SESARJU has developed a new separation method called D2-C2 (Dynamic Density Corridor-Concept) which provides new functionalities for strategic and tactical deconfliction services in urban and suburban very-low level environments. The airspace is organised in dynamic segments (volumes) and high-level speed corridors using predefined geo-reconfiguration of rha airspace according to the traffic density and drone performances, while high-speed corridors allow the movement of drones in larger trajectories, sharing the same heading, reducing potential conflicts between the vehicles.

WHAT ARE THE AREAS UNDER INVESTIGATION BY THE PROJECT USEPE?

- Investing approaches for a safe separation;
- Exploring the use of machine learning (ML) algorithms serving several purposes; The developed ML engine provides an automated quantitative assessment of separation management;
- Investigating how the wind field could affect the drone's observation in the urban area;
- Producing a common metric for measuring and comparing drone traffic densities.

WHO IS INVOLVED IN THE PROJECT?

USEPE project brings together seven beneficiaries from different countries including industries, technological centres, local authority representatives and universities. Close cooperation has been taking place with an external Stakeholder Advisory Group and through an initial survey and workshop with the rest of stakeholders.

More about the project
More about U-space
https://sesarju.eu/news/u-space-separation-europe-usepe

Alliance for New Mobility Europe

AME is an Alliance for all aerial mobility stakeholders in Europe, suppliers and users, private and public with a focus on integrating UAVs and VTOLs into aviation and other ecosystems. Its objective is to create a real European market for the new mobility industry by developing all necessary rules and standards that can benefit from them. Its members are:
https://mobilityalliance.eu/

Skydio · PARAZERO · THE EDGE COMPANY · d-flight · PENDENT

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THE AIRBUS ZEROe DEMONSTRATOR

After the E-FAN family which highlighted the potential for all-electric flight and the E-FAN X which was used to test the potential of hybrid-electric propulsion, the ZEROe demonstrator will be the next Airbus demonstrator.

THE A380 MSN-1 WILL BE USED AS THE TESTBED FOR H2 COMBUSTION TECHNOLOGY

The A380 MSN-1 is earmarked for a new role: to take the lead on testing the technologies that will be vital to bringing the zero-emission aircraft t market by 2035.

Mathias Andrimisaina, Airbus ZEROe demonstrator leader said:
"The A380 is an excellent flight laboratory platform for new hydrogen technologies. It is a safe and reliable platform that is highly versatile to test a wide range of zero-emission technologies."

The demonstrator will test groundbreaking zero-emissions technologies. It will carry 4 liquid hydrogen tanks in a caudal position as well as hydrogen-combustion engine mounted along the rear fuselage. The liquid hydrogen distribution system in which the liquid hydrogen will fill into a conditioning system in which the liquid hydrogen will transform into its gaseous form before it is introduced into the engine where it is combusted for propulsion

COLLABORATING FOR ZERO-EMISSION AVIATION

The hydrogen combustion engine is the key part of the ZEROe demonstrator programme.
CFM International is set to develop the hydrogen combustion engine and prepare it for testing. It will modify the combustor, fuel system and control system of GE Passport TM turbofan to run on hydrogen. This engine was selected due to its physical size, advanced turbomachinery, and fuel control capability.

Each technology component – hydrogen tanks, hydrogen combustion engine and liquid hydrogen distribution system – will be tested individually on the ground. Then, the complex system will be tested first on the ground and subsequently in flight. The first test flight is expected to take place in the next five years.

ZEROe
Towards the world's first zero-emission commercial aircraft
DISCOVER

J.P.S. from information airbus.com

ABOUT ICAS 2022

By Anders Blom, FTF, VP CEAS

THE 33RD ICAS CONGRESS WAS HELD IN STOCKHOLM, FROM 4 TO 9 SEPTEMBER, HOSTED BY FTF AND INNOVAIR

The ICAS (International Council of the Aeronautical Sciences) congress series started 1958 on the initiative of Harry Guggenheim and Theodor von Kármán. Since then, the series has rotated in the world on a biannual basis, and the 33rd congress has just been held in Stockholm, Sweden, with a record number of attendants, some 1000, from 35 countries and all continents. As usual the event was organized by the national member society, The Swedish Society for Aeronautics and Astronautics, and in collaboration with the Swedish strategic programme for Aeronautics, Innovair.

A new ICAS digital pioneering initiative was organized immediately prior to the main congress with some 50 participants being invited, based on the content in submitted congress abstracts. This event is led by the institute of System Architectures in Aeronautics of DLR (The German Aerospace Centre) and is planned to become a permanent feature of ICAS congresses. The event was jointly organized by DLR and the Swedish Aerospace Research Center at the Royal Institute of Technology. The outcome of this workshop, in topics like new modes of transportation, Greening, Multi-Disciplinary Optimization, Artificial Intelligence etc, was presented at the ICAS congress to let all attendants become aware of this new possibility for cooperation.

The congress had some 600 technical papers presented in 14 parallel sessions. These included seven plenary lectures, starting with the Daniel and Florence Guggenheim Award lecture by Anders Blom and ending with the von Kármán Award presented to the Clean Sky 2 JTI. In order to enhance the overall scientific level of the congress a large number of invited keynote lectures and complete invited sessions were organized. Together with an effort to increase the number of students this created an interesting balance of experienced persons interacting with the future generation of scientists and engineers. To further stimulate such interaction a special speed mentoring event was held immediately prior to the student party sponsored by Saab.

The technical programme held high quality thanks to the efforts by the ICAS Programme Committee that evaluated all abstracts and selected the best papers for presentation. Sessions included traditional areas as Aerodynamics, Structures and Materials, Flight Mechanics, Propulsion, Aeroacoustics, Testing and Measurements, but also topics as Future Combat Aircraft Systems, Systems of Systems, and Universities as part of the Innovation system. However, a major focus of this congress was clearly on the environmental aspects of Aeronautics. Papers on sustainability went from measurements of atmospheric physics to hybrid electric aircraft, hydrogen propulsion and sustainable aviation fuels. Both research papers and ongoing activities at Boeing and Airbus were presented, as were summaries of the results from Clean Sky 2.

Although presentations varied broadly it became quite clear that by and large most actors, from all around the world, are aligned in their efforts. A summary of the situation is that access to Green Energy is paramount. That energy can be transformed into several classes of fuel but for the large aircraft that totally dominate fuel consumption and emissions there are two ways to solve the problem, either by using Green Liquid Hydrogen or by replacing today´s Kerosene with new Sustainable Aviation Fuels. Clearly there are major challenges remaining for producing both these fuel types in large enough quantity at a price level that allows for a continued business case by the airlines operating next generation of aircraft.
Another important message from this congress, based on in situ environmental measurements, is that carbon dioxide only contributes around one third of the total emissions from aviation. The other parts are nitrous oxides and contrails with the latter being dominant.
To reach the very challenging aim of net zero emissions by 2050 the next generation of aircraft needs to be available at the market around 2035. Hence, all actors need to continue working together for this purpose.

Apart from the technical programme, ICAS 2022 offered a social programme with a reception in the City Hall, hosted by the Stockholm City Council, and a banquet at the Vasa Museum. A large exhibition by the congress partners highlighted products and activities from Saab, GKN, Boeing, Airbus, Clean Aviation, DLR, smaller enterprises, and a Swedish Pavilion with both SMEs, Armed Forces, and academia displaying their participation in the national innovation system.
After the Congress, visits were arranged at the Saab factory and the Innovative Materials Arena, located near the airport in Linköping.
ICAS 2022 was a great success and will be followed by ICAS 2024 in Florence, Italy, and ICAS 2026 in Sydney, Australia.

ABOUT THE TIGER PROGRAMME
Tiger MkIII : OCCAR-EA moves forward on the Tiger Programme with major upgrade of Tiger Combat Helicopters

Writer: Xavier Gadoullet / OCCAR-EA Tiger Programme Division / MkIII Type Manager.

On the 2nd of March 2022, OCCAR has signed on behalf of France and Spain, with Airbus Helicopters and MBDA France, a contract for the mid-life upgrade of the combat helicopter Tiger, known as Tiger MkIII Contract. This significant milestone was very much awaited by the end-users of the two Nations, as it will provide an enhanced system with state of the art capabilities, getting rid of the foreseen obsolescence on the existing Tiger to pursue the engagement of Armed Forces and ensure the continuous usage of the combat proven attack helicopter for the decades to come.

HISTORY OF THE TIGER

The Tiger helicopter is a multi-role combat helicopter fully developed in Europe and currently in service in France, Spain, Germany and Australia. It was designed from a common platform complemented with several sets of equipment building a number of variants tailored to the customers' requirements.

The Programme was initially placed by France and Germany under OCCAR Responsibility since its legal status was achieved in 2001. In 2004, Spain joined the Programme. In 2001, Australia ordered 22 Tiger Helicopters: the cooperation with Australia was formalized in 2009, granting Australia an Observer status in the Tiger programme.

The current variants are known as:

- HAP-F: Hélicoptère d'Appui et Protection – France
- HAD-F: Hélicoptère d'Appui et Destruction – France
- HAP-E: Helicoptero de Apuyo y Protection – España
- HAD-E: Helicoptero de Ataque y Destruccion – España
- UHT: Unterstützungshubschrauber Tiger – Germany
- ARH: Armed reconnaissance Helicopter – Australia

Currently, OCCAR manages the In Service activities covering 51 helicopters for Germany, 68 for France and 18 for Spain. In addition, 22 helicopters are directly supported by Airbus Helicopters for Australia.

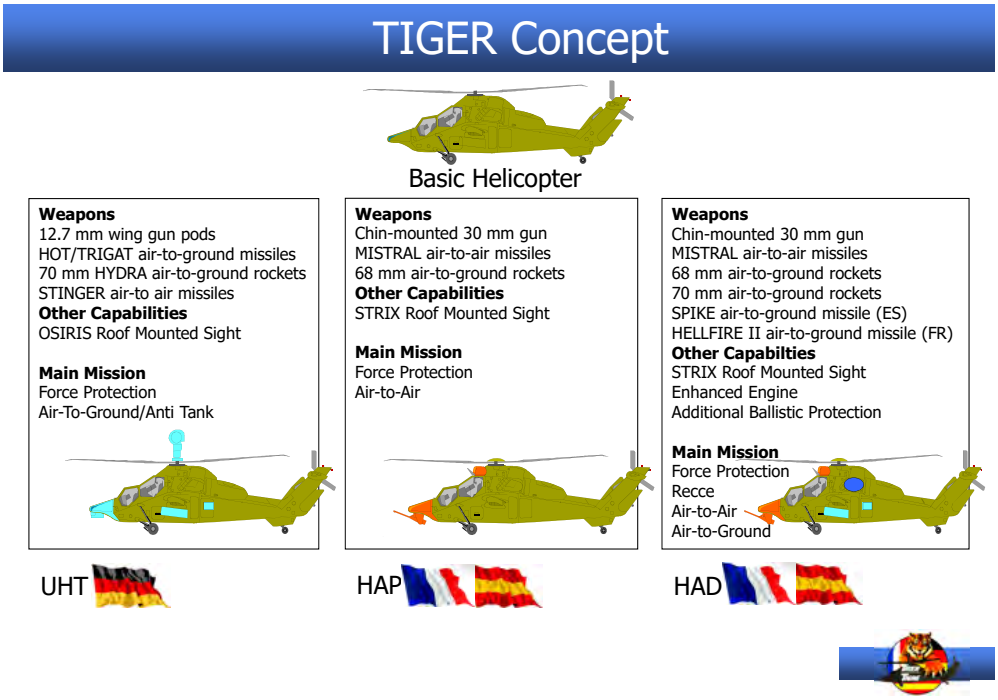
The Tiger concept is based on a common basis, supplemented with dedicated equipment for each variant. As an example, the HAD is equipped with a 30mm turreted gun developed by Nexter, Air to Air Mistral 2 missiles from

HAD (France, Spain)

MBDA, different kind of Air to Ground Missiles (Lockheed Martin Hellfire for France, Rafael Spike for Spain), different kind of Rockets.

In addition the HAD is equipped with EO/IR sensor mounted on the roof of the helicopter (STRIX Roof Mounted Sight), developed by Safran Electronics and Defense and with a specific helmet from Thales, called TopOwl, to allow direct link between what is seen by the pilot and the actions of the helicopters.

The engines are MTR 390-E, developed by MTRI, a consortium of MTU, Safran Helicopters Engines, Rolls-Royce and ITP. MTR 390-E is an enhanced version MTR 390-2C, specifically developed for the Tiger combat helicopter HAD, and is characterized by its low volume, high reliability, easy maintenance and enhanced power, especially for take-off.



The Tiger helicopter developed and produced by Airbus Helicopters, is the first all composite helicopter in Europe. With its high agility, its use of stealth technologies, its wide range of equipment it has been intensively used by France, Spain and Germany in many operational battlefields, such as Afghanistan, Libya and Mali.

TIGER MkIII – FOUNDATION

In 2015, satisfied with the current use of the TIGER attack helicopter, and understanding the upcoming challenges (obsolescence treatment, limited growth potential) France, Spain and Germany decided to jointly launch an architecture study for the midlife upgrade of this weapon system, in order to pursue its use for the decades to come. OCCAR Tiger Programme Division managed the related contract with Airbus Helicopters. The requirements of Nations were focused on three main objectives:

- anticipate any obsolescence case, by defining a new avionic, in line with the state of the art of future aircrafts;
- improve the existing capabilities, such as armaments, radios, visors and sensors;
- create additional capabilities, especially in the area of the modern battle management and communication capabilities in 21st century scenarios.

The outcome of this Architecture Study was the choice of a common architecture baseline for the new Tiger variant, so called MkIII, based on an avionics suite in line with Airbus Helicopters policy for their future civil platforms, and adapted for the military needs of Tiger. Taking into account their own operational needs, Nations selected on top a set of new equipment, to be integrated by Airbus Helicopters.

Following this Architecture Study, a new contract was placed by OCCAR with Airbus Helicopters, MBDA France and Thales, in order to ensure the feasibility of the integration of these new equipment and new avionics on the Tiger platform. This Derisking Study provided fruitful results regarding the potential of the future MkIII TIGER, and paved the way for the next MkIII steps. It especially allowed freezing the configurations foreseen for the MkIII Tiger, taking into account the three main objectives mentioned above.

Regarding the new avionic suite, the selected one is based on Thales "FlytX" product. The cost effort will be limited thanks to the synergy with civils helicopters, as per Airbus helicopters policy. However, this avionics will be to be customized for Tiger needs, with a complete reassessment of the Pilot and Gunner concepts, thanks to the high powered computers with future growth potential, and the introduction of modern touch screens. The choice of an avionic architecture based on the civil fleet state of the art make possible to reach the expected high standards while being in line with Nations budgets, and will definitely facilitate the support of the helicopter in the future.

Regarding the improvement of existing capabilities, the Tiger MkIII will be equipped with a new Pilot and Gunner helmet from Thales, called TopOwl Digital Display, and a new Roof Mounted Sight from Safran Electronic and Defense, called EUROFLIR 510. Combined together, with higher performance processors, improved detection, identification and laser capabilities, increased of numbers of embedded sensors, those two systems will bring a real

breakthrough for the Tiger and will be a real operational game changer for the end-users. Many other systems will be upgraded within this project, with some components to be replaced, like the Automatic Flight Control System, the Air Conditioning System, and the navigation system. The Electronic Warfare Suite will also be totally renewed in order to be better adapted to the combat fields. In addition, the mission and armament system will be totally modernized with the introduction of new capabilities especially in the area of the centralized data processing, with data fusion and correlation.

Furthermore, the armament suite will also be upgraded or replaced in order to enhance Tiger Air-to-Ground and Air-to-Air capability. For the first one, it has to be noticed the integration of the new AKERON-LP missile, developed by MBDA in the frame of the OCCAR MAST-F Programme. It is a brand new Air-to-Ground Missile with man in the loop capacities, based on data link between the missile and the helicopter. For the Air-to-Air capabilities, the upgraded MBDA Mistral 3 will be integrated. The Rockets and turreted gun systems will also be enhanced. Finally, the Tiger MkIII will be fully connected to the Digital Battlefield. Software Defined Radios including capabilities for modern data communications, crypto and many waveforms, based on Thales CONTACT solution will be integrated. The Tiger will also benefit from specific modems for exchanging data with UAVs (Manned-Unmanned Teaming) or other aircrafts, allowing for example extended field of view without exposure of the crew. In addition, to improve real time share of threats, mission data and situational awareness between the different stakeholders, dedicated national Battle Management Systems will be integrated: with ATOS system for French MkIII variant and INDRA system for Spanish MkIII variant.

Overall Tiger MkIII will be a strongly enhanced helicopter, built to meet Nations requests for modernity, to face new operational challenges, while preserving all the current advantages of the existing helicopter. Thanks to all these improvement, Tiger will enter into a new era, by adapting the Weapon Systems to modern state of the art equipment and allows its use for several decades.

TIGER MkIII – NEW CHALLENGES

In parallel to the management of the Derisking Study, OCCAR negotiated with Industry the placement of the Tiger MkIII contract. This global contract is now in place and supports :

- the development phase up to certification and qualification of the new MkIII design;
- the production phase: upgrade of the current Tigers to MkIII standard;
- the initial In-Service Support phase, in order to ensure the supportability of the MkIII Tigers following upgrade and delivery of the first helicopters to end-users.

Initially foreseen for France, Spain and Germany, The contract was finally signed on the 02 March 2022 by OCCAR on behalf of France and Spain. Germany has still the possibility to join the project in the future.

The first prototypes test flights are expected in 2025, and the first deliveries are due in 2029 for France and 2030 for Spain. In the end, the contract will allow the upgrade of 67 helicopters for France (including an option of 25 helicopters to be upgraded in a second stage) and 18 helicopters for Spain. The Final Assembly Line will be located in Spain, in Airbus facilities of Albacete.

This major OCCAR contract is placed to Airbus Helicopters and MBDA France as co-contractors. Many other industries are involved in this main contract either as subcontractors, or via other OCCAR or national contracts. On top of the technical challenge, Tiger MkIII programme will have a strong European footprint, and will therefore strengthen the development within the European defense industry and maintain the European competency in terms of complex attack helicopters.

This programme shows again the key role that OCCAR is playing in the European Defense area : preparing the future of European Defense, being a center of excellence for management of multi-billions contracts, facilitating and promoting convergence of views between European Nations to define the frame of a successful collaborative programme, and managing contracts through best practice programme management procedures, searching cost efficiency for the benefit of Nations.

EUROPEAN MALE RPAS: THE EFFICIENCY OF COOPERATION FOR THE BENEFIT OF THE MOST AMBITIOUS OPERATIONAL NEEDS

By Guillaume Houël, OCCAR-EA, MALE RPAS Acceptance Type Technical Manager, and Justin Vanderhaeghe, OCCAR-EA, MALE RPAS Mission System Technical Manager

Guillaume HOUËL

Justin VANDERHAEGHE

Co-funded by the European Union

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INTRODUCTION

Recent events have brought public attention to the increasing importance of drones, also known as UAVs (Unmanned Aerial Vehicles) or RPAS (Remotely Piloted Aircraft System), in current conflicts: during the Nagorno-Karabakh War, Azerbaijan overwhelming military superiority with Bayraktar TB2 systems has left marks on people's mind. More recently, the intensive usage of drones by Ukrainian forces caused serious damage to the Russian Army, slowing down their progression despite their great numerical superiority. Drones represent a game changer for military operations that significantly alters the balance of forces.

Among the wide variety of drones, MALE (Medium Altitude Long Endurance) systems are characterized by an operational altitude around 30.000 ft, and a flight endurance of more than 24 hours: by comparison, they can fly higher and longer than airliners. With a size and weight comparable to business jet aircrafts, they are usually operated via satellite communications, and are equipped with high performance sensors, like radars or cameras, and sometimes weapons, to carry out armed ISTAR missions (Intelligence, Surveillance, Target Acquisition & Recognition).

For the past decades, MALE systems have become the "eye in the sky", and a key player in military operations: their endurance, range and discretion enable the operators to collect precise and real-time intel on the battlefield, and to support and coordinate ground, naval and air operations. The undeniable value of these systems comes with an advanced level of technology and a high level of complexity, which explains why, unlike lower class drones (hand-held, close, or tactical drones), only a few MALE UAVs systems have been designed and used in battle-proven conditions.

Today's MALE UAV market is ruled by a limited number of actors, mostly American or Israeli, who managed to combine decades of field experience with substantial investments on development activities, and established a strong industrial base. Although they procured non-European products in the past decade, France, Germany, Italy and Spain, recently launched a MALE cooperative programme, called "European MALE RPAS" or "Eurodrone", in February 2022, in collaboration with Airbus, Dassault and Leonardo. This ambitious programme aims at jointly developing a new cutting-edge generation MALE system. It will provide European nations with

a strong base to establish their decision sovereignty and action autonomy in the unmanned aviation industry. This successful European cooperation is managed by OCCAR, a unique organisation with a proved efficiency in managing complex European cooperation armament programmes.

EUROPEAN MALE RPAS SYSTEM AT THE CUTTING-EDGE OF INNOVATION

Eurodrone in mountain environment © Airbus

In most current military operations, from the war on terrorism against a non-state enemy, to High Intensity Warfare like in Ukraine, information is essential. The mission of drones and especially MALE systems, is to master intelligence before, during or after an operation.

- Preparing a mission is a tough and complex task: prior to giving a "green light" and sending troops on the battlefield, decision makers must assess the risks and precisely identify the targets, based on accurate and reliable information. Upon this information lies the success or the failure of a mission, the life or death of military troops. A MALE system in fact, can be used to discreetly observe a terrorist in his hideout: how many armed vehicles are there? how many enemies are armed? what are the habits of the target?
- Once the mission is launched, the tactical situation can change very quickly. It is a matter of minutes, sometimes seconds. A MALE UAV plays a key role providing the ground or naval actors involved in the operation with real-time intelligence and weapons.
- When the mission is over, the results can be measured with a MALE high resolution sensors, to assess, for example, the numbers of terrorists neutralized: it is called BDA, "battle damage assessment". The data collected can be used either immediately as evidence, or later on for future operations.

Mission is at the heart of European MALE RPAS design, set to be the most advanced system on the market with cutting edge technologies.

The air vehicle itself is designed to be the best of its class. In the battlefield, a situation can change at any moment and rapidly become critical: intel is a precious advantage that expires quickly, and time is key. The European MALE RPAS can reach the operational area 25% faster than any other MALE platform. Its operational endurance, optimized for heavy configurations (including fully armed configurations) is more than 2.5 times higher than the competitors.

Navigation performance is also one of the European MALE RPAS main assets: if you know precisely where you are, you know exactly where you look… and eventually you shoot precisely where you aim. Its navigation system utilizes both Galileo, the new European GPS, and the US GPS. This dual mode increases navigation accuracy, but also makes it more resilient to GPS signal degradation, or hacking… and when GPS signal has been lost or compromised, as experienced in recent armed conflict, European MALE RPAS is still able to take-off or land automatically, and perform its mission thanks to its high performance inertial navigation system.

"Detect without being detected": if you can hear a mosquito flying in the desert silence, all the more can you hear the engine and propeller of an aircraft that weighs several tons. Noise detection is critical for MALE operations: European MALE RPAS is designed with such a low acoustic footprint that it can get 3 times closer to the enemies than current MALE platforms without being detected.

Yet, even the best remotely piloted aircraft is useless without effective sensors: to detect the targets over land and sea, the European MALE RPAS integrates the most advanced sensors with unrivalled performance. Its sensors are designed to detect smaller targets with 1.5 times greater range and 20-30% better and more detailed resolution at the same distance than other competitors: with the European MALE RPAS, threats can be identified faster and more accurately.
A MALE system can accomplish its mission in solitude but it is mainly designed to interact with multiple actors, and one of its main capability is to enhance the synergy between multiple domains: fighters, AWACS, ships, ground troops, artillery, satellites…; in this respect, European MALE RPAS major technological breakthrough is certainly in its connectivity features. The aircraft, but also its ground control station, are acting as communication nodes to link together decision makers and ground, air and naval actors.

Here is a scenario that can give an overview of the connectivity substantial benefits of the MALE RPAS: let us imagine that, on a war zone, Special Forces engaged in a covert operation have detected an opportunity target. With a European MALE RPAS in the area, they can now immediately send sensitive information to the command centre. The MALE RPAS is then able to confirm the identification using its own sensor or cross-checking with other connected sources, and establish direct contact between ground troops and allied fighter jets for a quick and appropriate response. When time is key, communication is crucial, especially in inter-allied operations. The European MALE RPAS is a game changer, designed as a mission communication server to manage, collect and disseminate data using secure channels and robust datalinks to prevent cyberattacks.

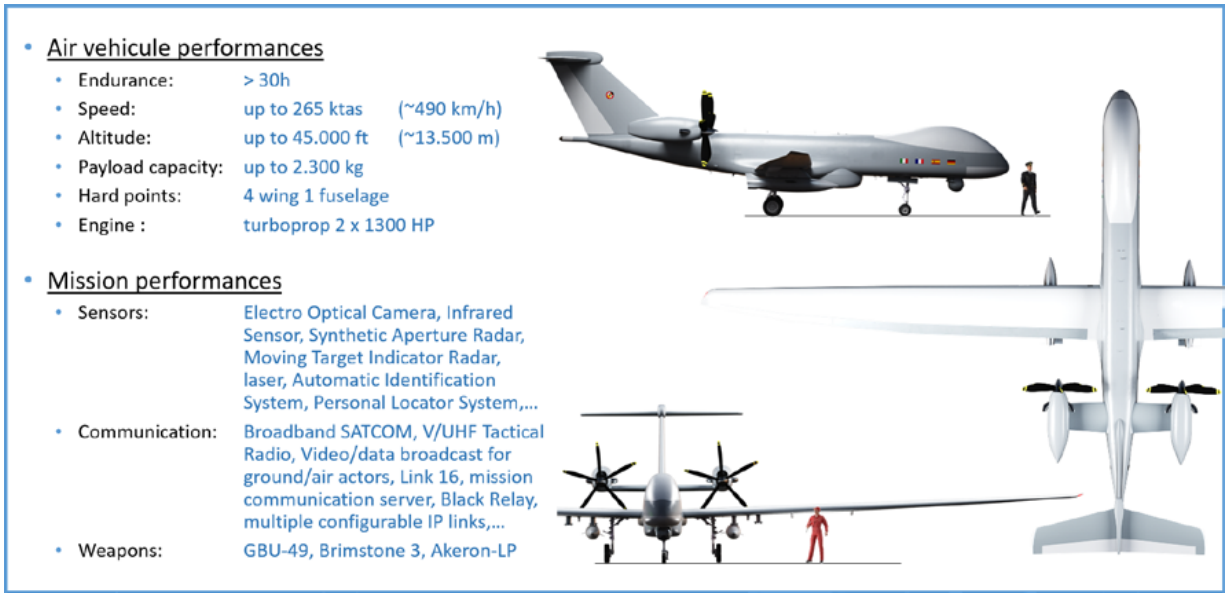
MALE systems are not bombers. However, their capability to quickly engage opportunity targets without any delay other than the human decision explains the increasing use of armed drones in modern operations. Compared to its competitors, the MALE RPAS carries 1.5 times more weapons, bombs or missiles, and a full range of armaments to neutralize a wide range of target types: bunkers, tanks, fast moving pick-up, concealed sniper, naval vessels… MALE RPAS is also integrating a new generation of weapons, guided not by one, but a combination of sensors, like laser designation, radar signature, image tracking or GPS coordinates. In the future, MALE RPAS sensors could also boost the performance level thanks to its complex and modular interfaces, like a datalink between the aircraft and the missile, collaborating together to enhance strike precision.

War is a very multifaceted and continuously evolving phenomenon. What is happening now in Ukraine teaches us a lesson: war is unpredictable, and evolves much faster than weapon systems. Who could have possibly anticipated, 2 or 3 years ago, today's battlefield environment, when most of the conflicts involving European forces were still asymmetric and located far away from our territories? When the threats can hardly be anticipated, it is essential to design a military system to incorporate new capabilities for future quick evolution: this is what engineers call "growth potential".

It means European MALE RPAS, which is already planning future capabilities, is able to adapt to new scenarios by simply and rapidly integrate new national payloads. For example, a new communications jamming capability could easily be added by integrating an electronic warfare pod, thanks to its plug-and-play architecture. Mission capabilities can be scaled up with infinite possibilities: communication interception, electronic surveillance, directed energy or microwave weapons, torpedoes, antisubmarine warfare,… With such a significant growth potential, MALE RPAS will remain the best available solution on the market for the next decades.

European MALE RPAS is designed for much more than today's identified needs: with a maximum payload of 2,3t, it will be able to carry 35% more than its existing heaviest payload configuration (fully armed). European MALE RPAS has the highest multi-payload capability in the

Collaborative combat © Airbus



Technical overview © OCCAR-EA

market, and unlike its competitors, this capability does not imply major endurance sacrifices.

The current situation in Ukraine also shows that the war is at Europe's door and that it is crucial to manage and control information. MALE systems have a significant role to play in these new conflicts, and it now becomes essential to share civil airspace with civil aviation and fly over populated areas in order to enable operations from, or close to, homeland territory. European safety standards have to be considered to avoid limitations that could affect the missions. The European MALE RPAS is designed to be the most reliable and safe to fly MALE on the market and certified for civil airspace integration, and will be able to fly the European sky without constraints. This major advantage compared to its competitors also opens a wide range of new possibilities, where the European MALE RPAS could be used for homeland training, or to support forest fire fighting campaigns, European borders surveillance, summit security,...

Thus, European MALE RPAS will be the most performant and innovative product ensuring to European nations outstanding operational capabilities. It will be a key pillar in any Future Combat Air System (FCAS) to improve the collaborative combat capabilities.

Contract signature between OCCAR and Airbus on 24 February 2022 © OCCAR-EA

A SUCCESSFUL EUROPEAN COOPERATION

Recent history is full of European failed attempts to design a MALE UAV: Sky-Y in 2007, Talarion in 2011, Telemos in 2012, F-Heron TP in 2012... the situation was complex, and the causes of failure multiple:

- Air forces were not experienced enough to define a precise operational need,
- regulations or standards for UAVs were not consolidated,
- European industry was unprepared and divided to reverse its technological backwardness,
- and procurement agencies were still groping for the appropriate acquisition strategy.

In the meantime, with no serious competition, US systems progressively conquered the European market with the very famous MQ9-Reaper, acquired by 7 European countries in the past 15 years. These acquisitions increased European nations' military capabilities, but significantly decreased their decision sovereignty and action autonomy. Indeed, the acquisition of these systems is subject to US government approval and once approved, the system is subject for its entire lifecycle to a strict control by the US government with US personnel permanently present at the home base to monitor and control the activities. And last but not least: there was little or no possibility to fine tune these systems to integrate specific features fulfilling national needs, mostly due to ITAR rules (International Traffic in Arms Regulation), a very strict US regulation regime that restricts and controls the export of defence technologies. This is particularly difficult if a nation decides to weaponize their US systems, because in this case a US Congressional approval is required, which follows a particularly long process that might take years to obtain.

Eurodrone in hangar © Airbus

A pan-european project © Airbus

However, despite its many limitations, this transition period gave the European armed forces the opportunity to progressively gain field experience, essential to define and converge on a common operational need. More recently, a strong political will to work together, combined with OCCAR renowned expertise, contributed to successfully prepare and launch the most ambitious aeronautical programme in Europe over the past 20 years. The success of this programme certainly lies in the necessity, but also the demonstrated efficiency and achievability of this European cooperation.

This cooperation is necessary because technological backlog in the domain of MALE UAV is substantial: indeed, MALE system might look like a simple aircraft with a pilot sitting in a ground control station, but many situations raise new technological challenges compared to traditional civil and military aviation. For example, even if the aim is not to replace a pilot, a MALE system must be able to react automatically and safely when communications are lost or jammed. In that case, which legacy system could possibly replace the accurate eyes and the well-trained decisions of a man on board in critical situations, like flying close to enemy threats, or in icing conditions? European companies excel at designing civil or military aircrafts, but they need to expand and strengthen their expertise in new domains to fill the disruptive technological gap between manned and unmanned aviation. History teaches us that this gap cannot be filled without combining the complementary competences of European industry. Any national programme will inevitably face the risk of an internal European competition, and fratricidal struggle…

This cooperation also provided an improvement in programme efficiency, with a unique contract structure covering not only the development phase, but also production and in service support: one harmonized specification, one single configuration, only one final assembly line, and one shared training and support solution. This structure allows great cost optimizations for a performant system in line with unchanged nations' expectations. Thanks to this cooperation, this programme is also co-funded by the European Union through the European Defence Industrial Development Programme (EDIDP). Moreover, significant development costs are inevitable for such a complex system, but they are balanced with a very competitive unitary cost and the lowest price per flight hour in the market: The European MALE RPAS is the cheapest MALE system to fly and maintain. System availability is also substantially improved in this cooperation: an increased number of delivered systems comes with a better logistic support and supply.

As experienced in the past, there is a fine line between success and failure for such ambitious programmes: how can we be sure the MALE RPAS will not fail like its predecessors? The lesson was learnt, and this cooperation is based on a cautious iterative approach. The MALE RPAS feasibility was initially challenged between 2016 and 2018 during a definition study involving programme participating states and industrial partners: this preliminary phase allowed all the stakeholders to set a common vision, define common goals and constraints, and implement them in a common unique configuration, through the full life cycle of the programme. Between 2019 and 2021, a tough negotiation phase also proved the resilience and strength of a complex industrial organisation, another pillar of this programme.

At the end, great ideas are nothing without a great execution. For this reason, France, Germany, Italy and Spain

have empowered OCCAR (French: Organisation Conjointe de Coopération en matière d'ARmement), an Organisation for Joint Armament Cooperation, to manage MALE RPAS programme. On 29 Aug 2022, German Chancellor Sholz, refered to OCCAR as the best cooperation tool "to improve the collaboration of our armed forces in very practical terms": OCCAR organisation is indeed a unique institution, created 20 years ago, about to become the first choice in Europe for cooperative defence equipment programmes. OCCAR places great importance on customer satisfaction, especially based on schedule, cost and performances, and developed and deployed efficient and pragmatic management practices.

Co-funded by the European Union

With UAVs, aeronautical sector has reached a historical turning point and European industry can only be built upon a programme of such magnitude. European MALE RPAS is designed to be the best system of its class for today's challenging missions, while paving the way for future capabilities. This successful cooperation is establishing a strong European industrial base that will guarantee European nations' sovereignty and autonomy.

SUCCESSFUL LAUNCH OF THE INNOVATIVE SATELLITE EUTELSAT KONNECT VHTS

On 7 September 2022 at 06:45 p.m. local time in Kourou (8 September 00:45 GMT), an Ariane 5 launcher, operated by Arianespace, successfully lifted off from Europe's Spaceport in Kourou (French Guiana) carrying the EUTELSAT KONNECT VHTS telecommunications satellite.

© Arianespace

EUTELSAT KONNECT VHTS (Very High Throughput Screening Screening): A NEW-GENERATION SATELLITE DELIVERING HIGH-SPEED BROADBAND AND MOBILE CONNECTIVITY TO BRIDGE THE DIGITAL DIVIDE ACROSS EUROPE

This satellite was built by Thales Alenia Space in France around the spacebus NEO all-electric propulsion platform. It offers a capacity that will be able to connect underserved zones throughout Europe. It carries a cutting-edge payload using disruptive technologies developed with the support of CNES (the French Space Agency) and the 'Investments for the Future' programme (PIA Programme d'Investissements d'Avenir in French), together with ESA. In particular, the payload includes the most powerful digital processor in the world, which combines agile capacity allocation, optimized spectrum use and support, and gradual deployment of network coverage on the ground.

With an instantaneous throughout of 500 Gbps in the Ka band, it will provide high-speed internet across Europe, especially in isolated regions with poor coverage, delivering service on a par with fibre-optic networks in terms of performance and cost, thus making a significant contribution to bridging the digital divide. It will also address the broadband connectivity needs of fixed telecommunications networks on land, sea or the air.

EUTELSAT KONNECT VHTS:
the satellite of all the superlatives:

- *9 m high*
- *6.4 tons*
- *45 m span*
- *Design life > 15 years*

https://www.thalesgroup.com/en/worldwide/space/press-release/eutelsat-konnect-vhts-communications-satellite-successfully-launched

GALILEO SATELLITE 'SHRIYA' ENTERS INTO SERVICE

29 AUGUST 2022: EUSPA WELCOMES SHRIYA SATELLITE TO THE GALILEO FAMILY

The Galileo satellite GSAT0224 entered into service on 29 August 2022. The satellite is named 'Shriya', after a Norwegian grade school student who won the Galileo drawing competition organised by the European Commission and the Norwegian Space Agency.

This event comes after extended In-Orbit Testing in January-March, followed by participation in the In-Orbit Validation (IOV) for EUSPA/ESA's finalized campaign for I/NAV improvement, in July-August.

Continue to serve Galileo users around the world

The previous Galileo satellite GSAT0223 named 'Nikolina' entered into service in May 2022. GSAT0223 and GSAT 0224 were part of the Galileo launch L11 on 5 December 2021. These two additional satellites mean that whether using a navigation device in a car or on a mobile phone, it will be possible to know one's exact position with even more precision and faster positioning than before. They also mean enhanced capabilities for the wide range of applications that depend on Galileo's accuracy, including search and rescue missions, the eCall emergency response system and precision farming methods, to name only a few.

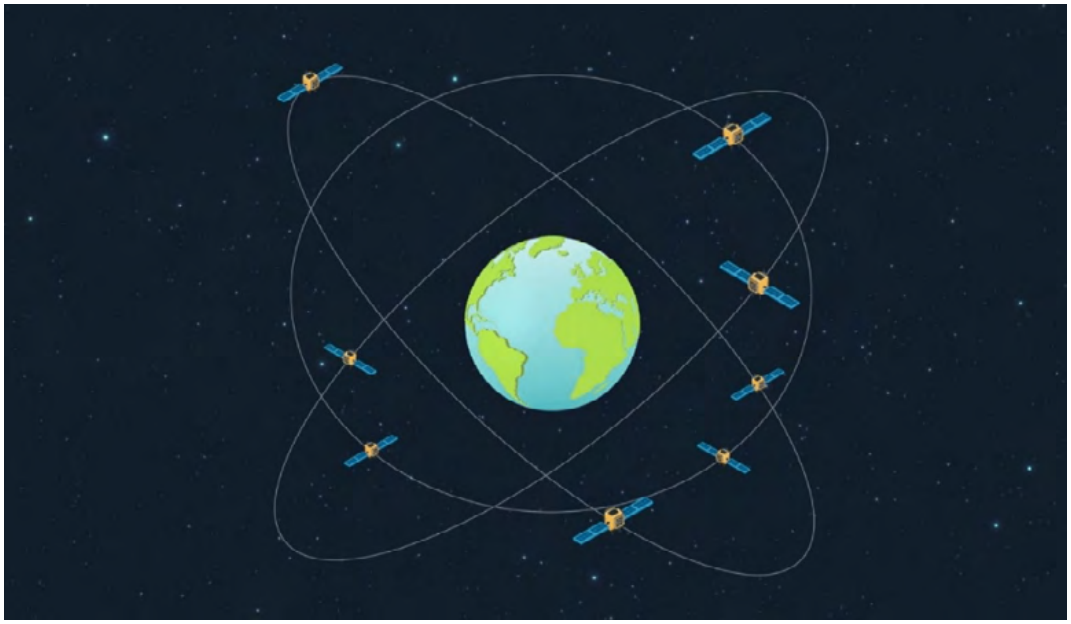
ABOUT NAVISP

NAVISP: AVANCING POSITIONING NAVIGATION TIMING (PNT) SOLUTIONS

NAVISP is an ESA programme aiming at generating innovative concepts, techniques and systems linked to the PNT sector:

- Element 1: Enabling PNT innovations along the value chain
- Element 2: Increasing industrial competitiveness
- Element 3: Support PNT initiatives in the Member States

To know more, consult https://navisp.esa.int



The Galileo satellite GSAT0224 entered into service on 29 August © EUTELSAT

MARIE SKLODOWSKA-CURIE ACTIONS – MSCA

By Jean-Pierre Sanfourche, Editor-in-Chief CEAS

DEVELOPING TALENTS, ADVANCING RESEARCH – SUPPORTING EXCELLENCE IN RESEARCH AND INNOVATION

The Marie Sklodowska-Curie Actions (MSCA) is the European Union's references for doctoral education and postdoctoral training.
The European Research Executive Agency (REA) manages the MSCA on behalf of the European Commission.

Historical background: over 25 years of European support for researchers' work

Since 1994, the MSCA have provided grants to train excellent researchers at all stages of their careers – be they doctoral candidates, or highly experienced researchers – while encouraging transnational, inter- sector and interdisciplinary mobility. In 1996, the programme was named, after the double Nobel Prize winner, 'Marie Sklodowska-Curie' in order to honour and spread the value she stood for. To date, more than 145,000 researchers have participated in the programme with many more benefiting from it, among them 12 Nobel laureates and an Oscar winner.

MSCA 2021-2027: developing talents, advancing research

Under Pillar I of HORIZON EUROPE, the MSCA are the European Union's reference programme for doctoral education and postdoctoral training. They support researchers from all over the world, at all stages of their careers, with a focus on their training, skills and career development.
https://marie-sklodovska-curie-actions.ec.europa.eu
https://marie-skolodovska-curie-actions.ec.europa.eu/calls/msca-postdoctoral-fellowships-2022

MSCA IN AEROSPACE

Here below are given three examples of EU-funded research though MSCA

- **HORIZON 2020 - GAM – Large Passenger Aircraft (LPA) PROGRAMME AIRCRAFT PROGRAMME**
- Starting on 1st of January 2021, ending on 31st December of 2023
- Grant agreement ID: 945583
- Funded under SOCIETAL CHALLENGES – Smart, Green And Integrated Transport
- Total cost = € 228 776 991
- Coordinated by AIRBUS France

ADVANCED TECHNOLOGIES FOR SUSTAINABLE EUROPEAN AVIATION

Committed to mitigating the impact of climate change and maintaining a competitive edge, the aviation industry is cruising towards the improvement of key technologies following the Clean Sky 2 Large Passenger Aircraft (LPA) programme. The EU-funded GAM-2020-LPA project will further mature and validate key technologies, among which:

- Advanced wings and empennage design making use of hybrid laminar airflow wing developments;
- Integration of most advanced engines into a LPA design;
- All new next generation of fuselage cabin and cockpit-navigation systems.

Dedicated demonstrators are dealing with research on best opportunities to combine new propulsion concepts and the opportunities to use scaled flight testing for the maturation and validation of these concepts via scaled flight testing.
Components of Hybrid electric propulsion systems are developed and tested in a major ground based test rig. The LPA programme is also contributing with a major work package to the E-Fan X programme.

21 demonstrators

The R&T activities in the LPA programme is split in 21 demonstrators. In the 2020-2021 period a substantial number of hardware ground and flight test items were manufactured, assembled and tested.
Now for some large items such as the Multifunctional Fuselage demonstrators or the HLFC (Hybrid Laminar Flow Control) wing ground demonstrators, the detailed design and manufacturing of test items is being commenced.
For the great majority of contributing technologies a TRL 3 or 4 (TRL: Technology Readiness Level) will be accomplished or even exceeded. Based on the data generated for each key technology, inputs will be provided to the overall Clean Sky 2 assessment.
LPA is also contributing to conduct Eco Design Life Cycle assessments for selected LPA technologies.

- **ITN INSPIRE: INSpiring Pressure gain combustion Integration, Research and Education**
- Starting 1st January 2021 – Ending 31st of December 2024
- Project leader: Universita Degli Studi Di Firenze
- Project Coordinator: Prof. Antonio Andreini – antonio.andreini@unifi.it

Eight Beneficiaries in the network:

1. Universita degli studi di Firenzi, Italy
2. Technische Universitat Berlin, Germany
3. CERFACS, France
4. ENSMA, France

5. Universita degli studi di Genova, Italy
6. SAFRAN, France
7. Kungliga tekniska Hoegskolan, Sweden
8. Politecnico di Torino, Italy

OBJECTIVE

The primary objective of INSPIRE is to advance Prssure Gain Combustion (PGC) as the next generation of sustainable, green, highly efficient and hydrogen-optimized combustion concept towards achieving the performance and emission goals of the next decades. Since much of the work in the topics within INSPIRE has previously progressed on an individual component level, INSPIRE aims at bringing relevant expertise together and to pursue solutions on an integrated level.

Five specific research objectives:

- Gain a deeper understanding of the impact of turbine integration on the specific combustion issues within both PGC solutions, including pressure effects, turbine interaction, performance losses, and ignition; this will be done for zero-carbon hydrogen combustion but also for hydrocarbon fuels;
- Investigate innovative turbine aerodynamics and cooling technologies designed to address the specific issues and unsteadiness associated with PGC, with the additional potential for spill-over applications in traditional combustion technology;
- Explore the applications of PGC cycles in exiting, as well as novel, power generation and propulsion applications, including the provision of targets for the highest potential PGC applications for future research targets, and highlight the importance of gas turbine and PGC applications within the energy context;
- Raise the global awareness of the potential of PGC applications and communicate to the research community the coupled effects of the above objectives on existing and future technologies;
- Raise and prepare a new generation of researchers, equipped with the skills to pursue such interdisciplinary problems as in PGC. It is an equally important objective to instil in this new generation an awareness of the global impact on the environment as well as their local impact on social responsibility.

Eight work packages: WP1 Management and Coordination – WP2 Constant Volume Combustion – WP3 Rotating Detonation Combustion – WP4 Enabling Technologies – WP5 Overall System Performance – WP6 Training – WP7 Dissemination Communication and Exploitation – WP8 Ethics Requirements.
INSPIRE brings together leading researchers, institutions and companies in the European gas turbine industry to provide a structured training of early-stage researchers (ESRs) in a diverse, international interdisciplinary and innovative environment. 15 ESRs are trained (see figure 1). Each ESR is supported by his/her own **Career Development Team (CDT**) which include, besides the ESR, the **Supervisor** and a **Mentor.**

NITROS – NETWORK FOR INNOVATIVE RAINING ON ROTORCRAFT SAFETY

NITROS: a MSCA Joint European Doctorate on Rotorcraft Safety

Helicopters are currently used in important applications providing a high contribution to society and economic growth.

Figure 1: Graphical representation of the INSPIRE activities, with the connections between ESRs and the four research

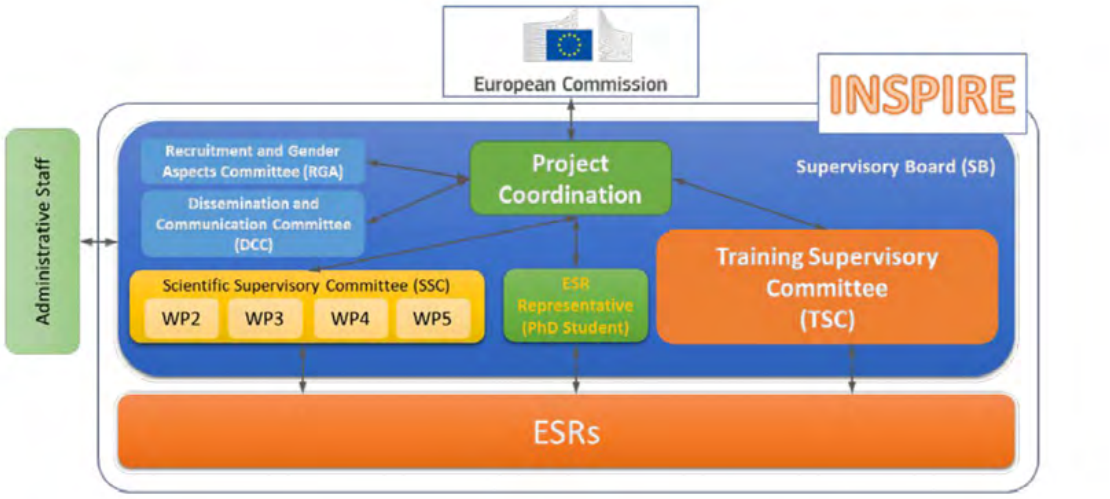


Figure 2: Project coordination structure

In the present times, the service of helicopters includes; search and rescue, coastguard, firefighting, disaster relief, territorial control, monitoring and inspection, heavy-lift support to construction and other sectors, aerial filming and media support. In the future, helicopters and other vertical flight vehicles, like tilt-rotors, compound helicopters, hybrids and a rapidly expanding class of easy-to(fly vertical take-off personal vehicles, are expected to see widespread use, as means of transport, exploiting the high capability to provide point-to-point connections.

However, if the expansion of the usage of rotorcraft vehicles is to follow the pace of growth followed by the fixed-wing public transport in the last years, several issues need to be urgently addressed to increase the use and the public assistance of rotorcraft. In particular, aspects related to complexity of the operations and safety are of primary importance, due to the fact that in the last 20 years helicopter accident rates, worldwide, remained unacceptably high; when compared to fixed-wing aircraft.
The complexity of the phenomena involved in rotorcraft flight calls for the training of engineers with a genuine multidisciplinary background.

NITROS'S MISION: TO TRAIN A NEW GENERATION OF "SAFETY VACCINATED" AEROSPACE ENGINEERS

The goal of NITROS is to train a new generation of talented young aerospace engineers capable of developing innovative approaches in a unique cross-disciplinary research and training programme encompassing Control Engineering, Computational Fluid Dynamics (CFD), Modelling and Simulation, Structural Dynamics and Human perception cognition and action, to address complex solutions for rotorcraft safety.

Three objectives

- **Objective I:** Develop a detailed framework for rotorcraft modelling integrating rigid-body and aero-servo-elastic modelling features capable of dealing with structural or propulsion/mechanical system failures n rotorcraft;
- **Objective II:** Understand how humans can safely and efficiently use and be interfaced with rotorcraft technology
- **Objective III:** The understanding of the unique and complex aerodynamic environment in which the rotorcraft are working, often in hostile conditions of wake encounter threats, undesirable interactions with obstacles, icing and brownout conditions.

The NITROS project is aligned with the European Union endeavour to reduce the rate of aviation accidents by tackling the critical aspects of technology developed for rotorcraft safety.
All these goals can be reached by exposing the young researchers to a **dynamic network** composed by European engineering schools and research centres working in rotorcraft field along with industrial partners including rotorcraft industry, operators and certification entities.

HOW IT WORKS?

The Horizon 2020 MSCA Joint European Doctorate NITROS projects are guiding 12 Early Stage Researchers though a double PhD programme. The Consortium of Universities is composed by some of the most important players on rotorcraft engineering training and research at European level: Politecnico di Milano, TU Delft, University of Glasgow, and University of Liverpool.

2022 AMONG UPCOMING AEROSPACE EVENTS

OCTOBER

10-12 October – EUROMECH – **Unification Microsystems and materials for NG engineering solutions –** Milan (Italy) – 616.euromech.org - https://www.euromech.org/

11-12 October – RAeS – **RAeS Conference** – London online - The alignment of ATM and U-Space/UTM - https://www.aerosociety.com/events/

12 October – SESARJU – **1st Annual Conference** – Airspace fit for the digital age – Brussels (Belgium) – https://www.sesarju.eu/

17-20 October – ASD-Europe – **IPS/ILS User Forum 2022** – The future of Integrated Product Support - Driving interoperability and digital transformation – Vienna (Austria) – Vienna Hotel Savoyen – https://www.asd-europe.org/ips-user-forum-2022-in-vienna

18 October – ESA – **ESA 4th REACH Workshop** – Paris (France) – ESA HQ Dausmenil – https://atpi.eventsair.com/esa-4th-reach-workshop

18-19 October – RAeS – **RAeS President's Conference New Space** – https://aerosociety.com/events/

18-20 October – Aviation Week – **MRO Europe Conference and Exhibition - #MROE** – Business in the commercial aviation aftermarket – London (UK) – ExCeL London – Royal Victoria Dock – 1, Western Gateway, London, E16 1 XL – https://mroeurope.aviationweek.com/en/home.html

18-20 October – 3AF – **TSA2022** – Towards Sustainable Aviation Summit – Toulouse (France) – https://www.3af-tsa.com

18-21 October – EASN – **12th EASN International Conference** – Innovation in Aviation and Space for Opening New Horizons – Plenary Talks- Thematic Sessions – Technical Workshops – Barcelona (Spain) – Universitat Politecnica de Catalunya – https://easnconference.eu

19-21 October – ESA/ALTER – **ACCEDE – COTS 2022** – Seville (Spain – https://www.doeeet.com/content/accede-workshop-on-cots-components-for-space-applications/accede-workshop-on-cots-local-arrangement-2022/

24 October –DGLR – Raumfahrtkonferenz Stuttgart – Wir sind FUTURESPACE – DGLR – Godesberger Allee 70 – 53175 Bonn (Germany) - https://www.raumfahrtkonferenz.de – https://www.dglr.de

24-26 October – ASCEND/AIAA – **Las Vegas, NV (USA)** – Live in & On line – 2022 Ascend will feature visionary speakers inspiring sessions about space – https://www.aiaa.org/

NOVEMBER

01-03 November – Abu Dhabi – **ABU DHABI AIR EXPO – Aviation & Aerospace Exhibition** – Abu Dhabi – AL BATEEN Executive Airport – 10-Year Anniversary – https://www.adairexpo.com

02-05 November – Indoaerospace – **Indo Aerospace Expo and Forum** – Jakarta (Indonesia) – Jakarta International Expo Kemayoran – http://indoaerospace.com

07-09 November – FSF – **IASS 2022** – International Air Safety Summit 2022 – Atlanta, GA (USA) – Omni Atlanta Hotel at CNN Center – https://flightsafety.org/events

07-09 November – ATCA – **ATCA Annual Conference and Exposition** – ATC/ATM industry – Aviation Cybersecurity - Washington D.C. (USA) – Walter E. Washington Convention Center – https://www.atca.org/annual

07-09 November – ICAO – **RPAS 2022 – ICAO RPAS Symposium – Unmanned Aviation 2022 - "To certify or not to certify"** – Montréal (Canada) – ICAO/HQ – https://www.icao.int/Meetings/RPAS2022/Pages/default.aspx

08-13 November – Zhuhai Airshow CO., Ltd – **AIR SHOW CHINA - China International Aviation & Aerospace Exhibition** – Zhuhai, Guangdong (China) – https://www.airshow.com/cn

09-10 November – DGLR – **DGLR Technical Symposium** – Berlin (Germany) – https://www.dglr.de.vernetzen/fachbereiche/kompetenznetzurk-stab

09-11 November – BIAS – **Bahrein International Airshow** 10-Year Anniversary – https://www.bahreininternationalairshow.com

14 November – RAeS – **RAes General Aviation Annual Light Aircraft Design Conference 2022** – https://www.aerosociety.com.events/

14-16 November – ICAO – **Unmanned Aviation 2022 –** Drone enable 2022 – Montréal (Canada) – ICAO/HQ – https://www.icao.int/Meetings/DRONEENABLE2022/Pages/Default.aspx

AMONG UPCOMING AEROSPACE EVENTS

15-16 November – MRO Management/RRM – **Predictive Aircraft Maintenance Conference –** Bremen (Germany) – https://www.predictiveaircraftmaintenance.com

15-17 November – ESA – **ESA Space Tech Expo Europe –** Bremen (Germany) – https://www.spacetechexpo-europe.com/

17 November – RAeS – **Next Generation Air Weapons –** One-Day Conference – London (UK) – RAeS/HQ – https://www.aerosociety.com/events-calendar/generation-after-next-air-weapons-one-day-conference/

23-24 November – ECCOMAS – **CIMNE/Chinese Aeronautical Establishment** – Workshop on Innovative Scientific/Technical Approaches for Climate Neutral Air Transport – Incl. Europe-China sessions – Barcelona (Spain) – UPC Barcelona Tech – https://eurochinworkshop2022.org

23-24 November – 3AF – **IES2022 – 16th European Forum on Economic and Strategic Intelligence** – Paris (France) – https://www.3af.fr-ies.com

29-30 November –RAeS – **RAeS Conference** – A bright Future of Fighting for Survival – Where will Aerospace be in 2035 and Beyond? – https:// www.aerosociety.com/events/

30 November -**02** December – ERCOFTAC – **Symposium UaPHC** – Understanding and Predicting Hydrogen Combustion – Barcelona (Spain) – BSC Barcelona Supercomputing Centre – https://www.ercoftac.org/events/

DECEMBER

06 December – EREA – **EREA Annual Event** – Brussels (Belgium) – https://www.erea.org

06-08 December – SESARJU – **12th SESAR Innovation Days (SIDs)** – Hosted by HungaroControl - Budapest (HU) – https://www.sesarju.eu/events

07 December – EASA – **EASA Certification Conference** – Regulatory updates – Innovations and future challenges in the field of certification – Cologne (Germany) – Maritim Hotel Heumarket 20 – https://www.easa.europa.eu

08-10 December – Aerospace 2022 – **International Conference and Exposition on Aerospace and Aeronautical Engineering** – Seville (Spain) – https://www.pages-conferences.com/2022

2023

JANUARY

23-27 January – AIAA – **2023 AIAA SciTech Forum** – This Forum will explore advancements in digital technology and the possibilities it creates in aerospace industry – National Harbor, MD (USA) – MD & ONLINE – www.aiaa.org/SciTech/CFP

24-25 January – Business Bridge Europe – **15th European Space Conference** – Brussels (Belgium) – spaceconference@b-bridge.eu

MARCH

29-31 March– 3AF – **AERO2023 – 57th International conference on Applied Aerodynamics** – Bordeaux (France) – https://www.3af-aerodynamics.com

APRIL

11-13 April – AIAA – **AIAA Defense Forum** – San Diego, CA (USA) – www.aiaa.org/defense

17-21 April – COSPAR – **5th Edition of COSPAR Symposium** – Singapore – https://www.cosparsg.org/

19-22 April – AERO – **Aero Friedrichshafen** – The Leading Show for General Aviation – Friedrichshafen (Germany) - Friedrichshafen Airport – https://www.aero-expo.com

24-28 April – ETC – **ETC15 - 15th European Turbomachinery Conference** – Fluid Dynamics and Thermdynamics – Budapest (Hungary) – https://www.euroturbo.eu

MAY

07-12 May – IAA – **14th IAA Symposium on Small Satellites for Earth Observation** – Berlin (Germany) – https://iaaspace.org/events/

20-22 May – ECCOMAS – **CM3 – Transport 2023** – Computational Multi Physics Multi Scales and Multi Big Data – Jyvaskyla, Finland – University – https://www.eccomas.org/

JUNE

05-07 June – ECCOMAS – **COUPLED PROBLEMS 2023** – X International Conference on Coupled Problems in Science and Engineering – Chania, Crete Island (Greece) – https://coupled2023.cimne.com

12-16 June – AIAA – **AIAA AVIATION Forum** – San Diego, CA (USA) – www.aiaa.org/events - www.aiaa.org/aviation

13-15 June – 3AF – **IAMD2023 – 15th International Conference Integrated Air and Missile Defence** – Porto (Portugal) – https://www.3af-integratedairmissiledefence.com

AMONG UPCOMING AEROSPACE EVENTS

19-21 June – ECCOMAS – **ADMOS 2023 – X International Conference on Adaptative Modelling and Simulation** – Gotheburg (Sweden) – https://admos2023.cimne.com

19-25 June – GIFAS/SIAE – **SIAE2023 – Paris International Air Show (54th Edition)** – Le Bourget (France) – https://www.siae.fr

JULY

09-13 July – CEAS/EUCASS – **AEC2023 – Joint 10th EUCASS – 9th CEAS Conference** – Lausanne (Switzerland) https://www.eucass-ceas-2023.eu

19-20 July – ICAS – **17. International Conference on Aeronautical Sciences** – Helsinki (Finland) – https://waset.org/aeronautical-sciences-conference-in-july-2023-in-helsinki

SEPTEMBER

05-07 September – 49th ERF – **European Rotorcraft Forum** – Bûckeburg (Germany) https://erf2023.dglr.de

DGLR – German Aerospace Congress – https://dlrk2023.dglr.de

OCTOBER

02-06 October – IAF – **74th International Astronautical Congress** – Global challenges and Opportunities – Give Space a Chance - Baku (Azerbaijan) www.iac2023.org

11-13 October – WEC - **WEC 2023 – 7th World Engineers Convention** - Prague (Czech Republic) – https://www.wec2023.com

17-22 October – SEOUL – Seoul ADEX 2023 – **Seoul International Aerospace & Defense Exhibition 2023** - Seoul (South Korea) – Seoul Airport – Seongnam Air Base – www.seouladex.com/intro/intro.php

23-26 October – ASCEND/AIAA – **ASCEND Conference** – Las Vegas, NV (USA) - www.aiaa.org/events

NOVEMBER

12-16 November – UAE– **Dubai Airshow 2023 – The Center of Aerospace Strategy and Inspiration** – Dubai (UAE) – Dubai World Central Al Maktoum Jebel Ali – https://www.dubaiairshow.aero