FCA

Flight Centric Air Traffic Control

3nd Newsletter - December 2024

News

Successful Completion of Ukrainian Exercise 001 – DLR & UkSATSE

The SESAR 3 FCA research project has reached one of its main milestones – the first of two real-time simulation campaigns. Throughout a total of ten days, two groups of Ukrainian air traffic controllers thoroughly tested the concept in simulated airspace above Flight Level 275, using DLR's in-house simulation platform TrafficSim.

The controllers underwent three days of intensive training to ensure optimal performance. This included familiarization with the simulator, the new tiled HMI design, and tools for managing normal and abnormal scenarios such as thunderstorms and degraded systems. A total of 15 training runs were conducted to prepare the controllers for five days of validation scenarios.

During the validation phase, the controllers engaged in 16 simulation runs featuring seven scenarios. These included normal operations, thunderstorms, degraded modes, and system failures such as communication and conflict resolution tool outages. Workload assessments were conducted using the Instantaneous Self-Assessment tool, supplemented by questionnaires and debriefings with human performance experts. Key findings showed that the controllers successfully managed the challenges, even under increased workload in failure scenarios.

This intensive validation exercise marks a critical step towards achieving TRL6 for Flight Centric ATC, paving the way for safer and more efficient air traffic management systems.

Preparations for Spanish Exercise 002 – Dry Run

The FCA project has reached an important milestone with the successful completion of a three-day dry run for Spanish Exercise, held from November 25 to 27 at CRIDA's offices in Madrid. During it, ENAIRE air traffic controllers, CRIDA researchers, INECO safety experts and INDRA technicians evaluated the validation infrastructure and their usage.

On the first day, the focus was on training, enabling the participants—three air traffic controllers and two pseudo-pilots—to familiarize themselves with the platform and its functionalities. Over the three days, the team assessed the realism of traffic scenarios, tested initial platform capabilities, and refined procedures.

Dedicated sessions were conducted to address key topics, including managing non-nominal scenarios and assigning conflict resolution responsibilities to an FCA controller. These discussions provided clarity on operational approaches and helped shape the framework for handling complex situations.

The insights gained from this dry run will steer ongoing enhancements to the platform and operational workflows for Spanish Exercise use cases. We continue working toward a mature and representative validation.

New LinkedIn Campaign – #ATCOsInFCA

This spring, the SESAR 3 FCA LinkedIn channel will launch an insightful new series titled **#ATCOsInFCA**. The campaign aims to spotlight the air traffic controllers (ATCOs) who played a crucial role in the two real-time simulations conducted as part of

the FCA (Flight Centric Air Traffic Control) project.

The **#ATCOsInFCA** initiative will not only introduce the individuals behind the simulations but also provide a platform to share their perspectives on the innovative concept. Through their voices, followers will gain unique insights into how the concept is perceived from an operational standpoint and the challenges and opportunities it presents.

The campaign will follow a structured posting schedule, with updates shared twice a week. Every **Friday**, a post will introduce one of the ATCOs who participated in the simulations. The following **Monday**, the spotlight will shift to their impressions and thoughts about the FCA concept. This format is designed to give the audience a comprehensive understanding of the concept and its implications from the perspective of those directly involved.

Stay tuned to the SESAR 3 LinkedIn channel for this engaging series, and don't miss the chance to meet the professionals shaping the future of air traffic management while gaining their first-hand insights into the FCA concept!

Launching Project's New Webpage

We are happy to announce the upcoming launch of our brand-new website for the Flight Centric ATC project, which is scheduled for January 2025. This platform will serve as the central hub for all project-related content, including news, updates, results, resources, downloads, videos, and key insights from our pioneering work in revolutionizing air traffic management. Whether you're a stakeholder, researcher, or just curious about the future of ATM, our website offers a comprehensive overview of our project's goals, challenges, and achievements.

Visitors can explore detailed project information, track progress on the latest milestones, and engage directly with our cutting-edge research. In addition, our interactive resources and media section will offer an in-depth look at the technology shaping the future of ATM.

https://sesar3fca.eu/

We invite you to stay connected with us as we continue pushing the boundaries of innovation in air traffic management.

Events

Ukrainian Exercise 001 Open Day in Braunschweig, Germany

After the final validation day of Exercise 001, an Open Day was hosted by DLR and UkSATSE. Stakeholders and interested parties were invited to receive insights into the SESAR 3 FCA project and details of the validation exercise. Attendees were also introduced to the upcoming second exercise led by ENAIRE and CRIDA A.I.E, alongside discussions on ATCO support tools and traffic rules.

The highlight of the day were two simulation sessions in DLR's Flight Centric ATC laboratory, where participants had the unique opportunity to take a seat at the controller working position, observe the working routine of the ATCOs in a typical validation run and get an introduction to the main functionalities and procedures of the system.

The event concluded with brief talks by subject matter experts Ana Martins on preliminary Human Factors-related findings, Predrag Terzioski on the impact of the FCA concept on regulations and licensing and Dmytro Tereshchenko on the ATCOs' conclusions on the concept.

Invitation to SESAR JU Annual Conference 2025

We are excited to invite you to the SESAR JU Annual Conference 2025, where our Flight Centric ATC project will showcase its latest developments! The event will take place on the 18th of February, 2025 in Brussels and bring together the leading experts in air traffic control innovation.

Be sure to visit our booth, where we will present key project demonstrations, including:

- **Ukrainian Exercise** (presented by DLR) assessing the Flight Centric ATC concept in terms of operational and cost efficiency, environmental impact, human performance, and safety. The exercise will also demonstrate the feasibility of civil-military coordination using an innovative radar display.
- **Spanish Exercise** (presented by Enaire/CRIDA) focusing on evaluating the operational feasibility and benefits of the Flight Centric ATC concept in Spanish upper airspace.
- **Fast-Time Simulation** (presented by AgentFly Technologies), supporting the Ukrainian exercise by simulating conventional ATC approaches and providing insights for Cost-Benefit Analysis (CBA).

This is a fantastic opportunity to see firsthand the advanced technologies and research efforts that are shaping the future of air traffic control. Don't miss out on engaging in discussions and demonstrations with our team.

For more information about the event, visit https://www.sesarju.eu/SJUAnnual2025

Presentation at EASN2024 conference

The 14th EASN International Conference on 'Innovation in Aviation and Space towards Sustainability Today & Tomorrow' took place from 8 to 11 October 2024 in Thessaloniki, Greece. This annual event brought together leading experts, researchers, and industry professionals to discuss advancements and sustainable solutions in the fields of aviation and space.

One of the topics of this year's conference was a presentation by Tobias Finck from the German Aerospace Center (DLR). Tobias Finck, alongside co-author Bernd Korn, presented their conference paper titled **'Requirements for an Allocation Center for the Flight Centric ATC Concept'**. This work delved into the essential requirements for designing and implementing an Allocation Center within the Flight Centric Air Traffic Control (ATC) concept.

The presentation generated significant interest among attendees, particularly those focusing on innovations in air traffic management and the integration of sustainable practices. By addressing the operational and technical aspects of an Allocation Center, the research contributed to shaping the future of efficient and scalable air traffic control systems.

Building on the success of the Thessaloniki event, the 15th EASN International Conference is scheduled to take place in Madrid, Spain, from 14 to 17 October 2025. This upcoming conference will continue to foster collaboration and knowledge exchange, with a renewed focus on sustainability and innovation in aviation and space.

Presentation at DACS2024 Conference

The 43rd Digital Avionics Systems Conference (DASC) took place in San Diego, CA, USA, from 29 September to 3 October 2024. The event brought together experts from across the globe to share advancements in avionics systems, with one track dedicated to the evolving field of Air Traffic Management.

Three noteworthy papers addressing Flight Centric ATC were presented by researchers from German Aerospace Center (DLR). These papers offered insights into key areas of interest for the aviation industry:

"Impact of Flight Centric Air Traffic Control on the Cost Efficiency of Air Navigation Service Providers" Authored by Tobias Finck and Bernd Korn, this paper explored how adopting a Flight Centric ATC approach can influence the cost efficiency of Air Navigation Service Providers (ANSPs). The analysis provided valuable data on potential cost savings and efficiency gains.

"Air-Ground Datalink Technologies (LDACS and Current CPDLC) in Flight Centric ATC: Analysis of a Fast-Time Simulation and Outlook on a Complementary Real-Time Simulation" Authored by Mara Weber, Ana P.G. Martins, Christiane Edinger, and Carmo Sonja Kluenker, this paper delved into simulation-based analyses of datalink technologies. It offered a forward-looking perspective on real-time applications and their potential impact on the ATC system.

"Evaluation of the Impact on Air Traffic Controllers of Air-Ground Datalink Technologies (LDACS and Current CPDLC) in Flight Centric ATC" This paper, authored by Ana P.G. Martins, Carmo Sonja Kluenker, Christiane Edinger, Sebastian Tittel, and Mara Weber, assessed the effects of advanced datalink technologies on air traffic controllers. The study highlighted operational benefits and challenges, paving the way for a more integrated communication framework in Flight Centric ATC.

Although these papers were not directly part of the Flight Centric ATC (FCA) project, they complemented its objectives and contributed significantly to the broader discourse in this area.

Blog

Deep Look Inside the Flight Centric – A Short Dive Into the History

The sectorless concept in air traffic control (ATC) represents a transformative approach to managing airspace, moving away from the traditional sector-based model towards a more dynamic and efficient system. Below is a short history of its development:

The Traditional Sector-Based Model

In the early days of aviation, airspace was divided into fixed sectors, each managed by a dedicated team of air traffic controllers. This system was designed for simplicity and local accountability. However, as air traffic volumes increased, the limitations of this model became apparent. Sector boundaries often caused inefficiencies, such as imbalanced workloads, high amounts of coordination between sectors and delays during periods of high traffic. Despite these challenges, the current system in the EU still follows this approach, although it allows for the merging or splitting of sectors within a specific framework.

Introduction to Sectorless ATM

The concept of sectorless Air Traffic Management (ATM) was first proposed by EUROCONTROL in 2001 (Vu Duong et al). This approach aimed to address the growing challenges in air traffic management by reducing the dependency on fixed airspace sectors. The idea gained further attention when Riviere introduced a route concept in 2004, exploring the potential benefits of this system.

Early Research and Proof of Concept (2010–2012)

From 2010 to 2012, the German air navigation service provider DFS, in collaboration with the German Aerospace Center (DLR), began conducting proof-of-concept simulations as part of the national project Airspace Management 2020. These simulations demonstrated the principal feasibility of sectorless ATM and identified several benefits. The radar display was divided into tiles, each showing the aircraft under the controller's responsibility, with the tile centred on the aircraft.

Key assumptions included 100% aircraft equipage with data link for controller-pilot communications and downlink of aircraft trajectories. The results indicated that the role of the controller would change significantly: there would be less reliance on radiotelephony, reduced coordination, and the potential to control up to seven aircraft simultaneously. However, situational awareness emerged as the key limiting factor, suggesting that improvements to the Human-Machine Interface (HMI) and automation could enhance performance. The simulations also highlighted the need for better assistance in finding conflict resolutions, particularly for short-term conflicts.

The TeFiS Project (2014–2017)

Between 2014 and 2017, the German government funded the TeFiS project (Technologie für Flugverkehrsmanagement in großen Strukturen), which further explored sector-less ATM in the German upper airspace above FL 375. This project involved eight weeks of real-time simulations aimed at validating the concept under more realistic conditions, such as using current voice communications instead of data links and the lack of airborne trajectories for conflict detection and resolution.

The project also focused on external coordination, which was not assessed in previous studies. Several HMI modifications and controller tool adaptations were required for the validation. Additionally, different strategies for allocating aircraft to executive controllers were explored. The findings reaffirmed earlier conclusions: the work of the controller would change significantly, with less radiotelephony, reduced coordination, and the potential to control up to seven aircraft simultaneously. However, the main limiting factor remained situational awareness, necessitating further research into improving the HMI and automation, particularly for conflict resolution.

SESAR 1 and the Continued Development of Sectorless ATM (2015)

In 2015, SESAR 1 published a task force report summarizing the status of sectorless ATM. The report concluded that, while no major barriers to research and development were identified, several key

considerations remained, particularly around coordination with adjacent Area Control Centres and issues related to air-ground communication frequencies.

SESAR 2020 and the Flight Centric ATC Concept (2017–Present)

The work on sectorless ATM continued in the SESAR 2020 program, using the new name of Flight Centric ATC (FCA). The concept was initially explored in Project PJ.10-01b in Wave 1, followed by PJ.10-W2-73 FCA in Wave 2. These projects brought the FCA concept to a maturity level of Technology Readiness Level 6 ongoing (TRL 6-ongoing).

The SESAR 3 FCA project aims to build on the work from SESAR 2020 and address the remaining aspects that could not be fully explored due to the disruptions caused by the Covid-19 pandemic. The goal is to bring the FCA concept to TRL 6, ensuring its readiness for broader implementation in the future.

Christmas Greetings

As the holiday season approaches, we want to take a moment to extend our warmest wishes to all our partners, colleagues, and friends. 2024 has been an exciting and productive year for our project, and we are deeply grateful for your continued support and collaboration.

May this festive season bring you joy, peace, and time to relax with loved ones. We look forward to working together in 2025 as we continue to innovate and shape the future of air traffic control.

Wishing you a Merry Christmas and a prosperous New Year!

Warm regards,
The Flight Centric ATC Project Team

Partners

EUROCONTROL

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We invite you to follow us on our channels to get updates of all the project's activities.

www.sesar3fca.eu

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