

THINK PAPER

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SYSTEM-BASED ATCO LICENSING



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The purpose of this document is to explore proposals for system-based solutions (and ATCO licencing) which could enable ANSPs to deploy Air Traffic Control Officers (ATCOs) more flexibly.

In the past years, several technical evolutions and novel on-going operational challenges require an assessment whether current¹ process remains the most adequate, if it needs some refinement or if a more radical change would be required. **The biggest constraint in the current process is the time required to train an ATCO and the scalability of the positions that an ATCO licence can cover.**

So far, the option of ATCO mobility – when understood as moving people around – has proved to be a limited solution for various reasons. Instead, technology now allows for “moving” airspace between ACCs while ATCOs remain in the same location. This alternative (virtual) ATCO mobility concept, as well as some other options have been studied in a few SESAR 2020 R&D projects.

In the European context, in the past eight years, several studies were undertaken and various position papers and action plans were developed in relation to (ATCO) training and licencing.

Elements to be considered for system-based ATCO licencing

Traffic complexity: Some very important elements to consider when discussing the possibility of implementing system-based licencing is the complexity of air traffic flows and places where conflicts between A/C most frequently occur, the frequency of vertical movement (climbs/descents), and sector capacities (maximum number of aircraft simultaneously on the frequency). Local conditions should also be taken into account, such as local procedures to specific sectors or groups of sectors, as well as the complexity of arrival and departure traffic from airports, as well as the number of airports served by a given TMA or APP services. **Therefore, it seems that the most realistic Units of air traffic control services or the area where it is possible to implement the concept of the system-based licencing are ACC sectors in the upper area airspace, with a low traffic density.**

Supporting tools: In order to be able to introduce licencing based on specific system standards, it would be necessary to implement the greatest possible degree of automation as well as supporting tools. Currently, the so-called predictive algorithms allow for the identification of conflict situations in air traffic and the use of the best deconfliction solutions based on the analysis of the execution of 4D flight trajectories of each operation and the impact of deviant factors on the execution of these trajectories. In the case of tasks related to group of procedures, it will be very important to use system and IT solutions allowing for the automation of the processing of data necessary to perform the actions, i.e. appropriately providing, in a digitised manner, information to the ATC about the procedure that must be performed for each flight or the correct execution of the trajectory of each flight, as well as automatic coordination between ATS Units. Certain ANSPs already have the possibilities of introducing automatic, digital and electronic coordination to eliminate manual and telephone coordination as much as possible. **Therefore, an enabler will be the use of system and IT solutions allowing for the automation of the processing of data necessary to perform the actions, i.e. appropriately providing, in a digitised manner, information to the ATCO about the procedure that must be performed for each flight or the correct execution of the trajectory of each flight, as well as automatic coordination between ATS Units.** An important element hereto is having sufficient bandwidth for voice and data communications.

Airspace model: The current airspace model is divided into separate areas of responsibility known as sectors. Each sector has a different size and shape due to a range of factors including geographical, political or national requirements, and traffic characteristics (e.g. flows, density and complexity). Several sectors may be temporarily grouped together at a centre level when traffic and operational complexity is low enough to enable a single ATCO team to control a larger volume of airspace. Local procedures describe the grouping of sectors with consideration given to controller workload, sector capacity and traffic flows. It can be assumed that after the operational implementation of Free Route Airspace, the model of the European airspace will begin to change. Its evolution will be towards moving away from permanent geographical boundaries within a particular country or FIR to the airspace model based on the traffic flows, complexity and hot spots within a particular area. It means that we will have to adjust or introduced system-based changes, deploy supporting tools and technological solutions which could result in higher level of automation, less complexity, higher predictability, and dynamic airspace reconfiguration. It will also allow ATCOs to work on a larger number of sectors which could dynamically adjust to the traffic demand and complexity².

¹ The ATCO licencing process as described in SESAR PJ10 D7.1.010 document.

² Still, such sectors are going to have a boundary and procedures related to it and local knowledge needs to be maintained in order to work safely. Nevertheless, it is envisioned that all ATC systems will contain information about FLAS and those data is properly presented on the radar display and will reduce the time to memorise local conditions and procedures. In the case of reduced air traffic, it will allow to work/operate with shorter training.

Elements to be considered for system-based ATCO licencing (continued)

A defined standardisation at the system level, supporting tools with the same or standardised functionalities and capabilities, standardised and simplified procedures will support implementation of totally changed airspace model design. **The first stage of this change may "lead" us to the model where sectors will be categorised according to the complexity of the traffic flows, and similarity of the relevant procedures. It means that with appropriate supporting tools there will be reduced need for a specific sector training and ATCOs will be permitted to work on a category of sectors.**

Endorsement process: A very important aspect of the implementation of system-based licensing will be the preparation of an appropriate training process and the endorsement conversion process. This process should include such areas as Harmonisation and simplification of procedures, Supporting tools, Automation of system functionalities, Automation tools reducing the level of knowledge of local conditions and procedures. **The basic pillars of proper implementation will be an open system architecture & service interfaces supporting new ways of dynamic ATS delegation, enhanced ATCO supporting tools and an increased automation support, all of which are elements identified as part of the Strategic Deployment Objectives in the 2024 update of the European ATM Master Plan.**

Open System Architecture vs Standardisation

Looking at the details of the relevant Strategic Deployment Objectives in the 2024 update of the European ATM Master Plan, it can be noted that several elements are considered to already be within the scope of the current regulatory framework. Some ANSPs and industry manufacturers have already committed to transition to this new service delivery model for ATM in Europe in June 2024. To achieve this, the regulatory bodies would also need to ensure that the appropriate legal, regulatory and standardisation frameworks is put in place.

Several other elements are to be considered, but are not deemed as a prerequisite to move towards a system-based licensing. These include:

Standardisation of CWP: allowing significantly to reduce time of interaction between human and machine, thereby increasing the automaticity and intuitiveness of the tasks and activities performed. Uniform and identical arrangement/location of individual tools and devices could further shorten the time needed to learn local conditions, procedures and characteristics of air traffic flows.

Standardisation of (C)HMI functionalities: It could be considered to develop one standard regarding both the display of permanent tables and positions on the monitor (the same set-up and order) and system functionalities enabling the repeatability of tasks and operations performed by Air Traffic Controllers.

Automation and AI Implementation: the possibility of using standard and AI algorithms will contribute to much higher prediction, automation and standardisation of functions and tasks performed by air traffic management systems, air traffic flow management systems, airspace volume capacity management systems and airspace management systems.

Another important element is liability: Today the air traffic controller is responsible and liable. In the future the system supplier would need to take over part of the liability, if the ATCO shall react only on proposals of the system.

CANSO Conclusions and Recommendations for System-based ATCO licencing

Several potential solutions to enable ANSPs to deploy ATCOs more flexibly have been investigated as part of SESAR R&D. These include Delegation of services amongst ATSUs, Flight Centric ATC, Non-Geographical Controller Validation, Increased Flexibility in ATCO Validations and Flexible ATCO Endorsement. The delegation of services solutions concept has been demonstrated as operationally feasible in several use cases, including night, fixed-time, civil-military and cross-border use cases. However, high traffic complexity, high airspace complexity, lower airspace with terminal areas and airport interfaces, non-nominal conditions and high traffic conditions have been identified as potential barriers to the concept. Some use cases have already reached TRL level 6 and can thus be considered for industrialisation. Standardisation of CWP and (C)HMI functionalities, automation, progressive implementation of AI support applications, Service-Oriented Architecture are all technical enablers that will facilitate the move to system driven licensing and training requirements, however they are not prerequisites³. An important element to consider hereby, as well as in relation to the industrialisation of the relevant SESAR or other solutions, is the need for technical enablers and an enabling regulatory and standardisation framework.

³ Note however that as soon as the concept is applied cross-border, some of these enablers become pre-requisites.

CANSO Conclusions and Recommendations for System-based ATCO licencing (continued)

CANSO Europe Members believe that we have a sufficiently mature environment to start moving to system-based solutions (and ATCO licencing) which could enable a more flexible deployment of ATCOs, e.g. by assigning a group of sectors or by complexity or by cross-border flow-based traffic allocation in a VERY SPECIFIC use case/operational environment:

- (Large) Free route airspace
- En-route control
- Low traffic density conditions
- Availability of specific system features/tools (e.g. CPDLC, Conflict Detection & Resolution tools, ...)
- Availability of a services oriented architecture/open system architecture to enable a safe and efficient service
- Availability of technical enablers to support data distribution and SOA

This transition should focus first on national level only and gradually evolve to cross-border.

As EASA will initiate the required regulatory adaptations to transition towards a system-based approach with phased implementation⁴, CANSO is committed to contributing relevant expertise (training experts, licencing experts, ATM system experts, ...) to assist in developing the training and licencing requirements that should initially be applicable to a very specific use case/operational environment.

Reference List

Date	Title	Author
2013-09	ATM European Social Partners Recommendations on Mobility of workers within the ATM sector	CANSO, ETF & ATCEUC
2016-03	ATM Automation: Guidance on human-technology integration	UK CAA (various contributors)
2016-06	Functional mobility of controller workforce (Presentation to NDOP)	FABEC (DFS)
2016-08	Prospects for “Remote” En-route Air Traffic Services	EP TRAN Committee (Steer Davis Gleave)
2019-03	NMB/24 Action Paper on ATCO Training	Network Manager
2019-04	Report of the Wise Persons Group on the future of the Single European Sky	European Commission
2019-06	Position paper on SES WPG report	CANSO
2019-09	CANSO Europe Vision 2035 – Action Plan	CANSO
2019-12	Position Paper on role of human in the design of the ATM/ANS system in 2035	EGHD
2020-12	Study on Air Traffic Controller (ATCO) and Engineering Staff (ATSEP) social issues and working conditions – Final Report	European Commission (TNO-NLR)
2021-05	ATCO Licensing Action Plan	EASA
2022-12	Think Paper #19 - ATC Mobility and Capacity Shortfalls	EUROCONTROL
2022-10	Position Paper on Human dimension aspects associated with ADSPs and Virtual Centres	EGHD
2023-11	Scoping Paper on Shortage of labour and skilled personnel with impact on operations, capacity, research and industrialisation in ATM	ICB
2019-05	PJ.10-06 – Non-Geographical Controller Validation D7.1 V1 data pack	SESAR JU
2019-10	PJ.10-01b – Flight Centric ATC V2 data pack	SESAR JU
2023-01	PJ.33-FALCO - “White Paper” - Roadmap to Generic Controller Validations	SESAR JU
2023-02	PJ.10-W2-73 IFAV – Increased Flexibility in ATCO Validations V2 data pack	SESAR JU
2023-04	PJ.10-W2-73 FCA – Flight Centric ATC V3 data pack	SESAR JU
2023-06	PJ.10-W2-93 – Delegation of services amongst ATSUs V3 data pack	SESAR JU

⁴ Strategic priority in the latest version of EASA European Plan for Aviation Safety (EPAS).

