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## CHALLENGES OF THE IMPLEMENTATION OF THE CONCEPT OF FLEXIBLE USE OF AIRSPACE IN THE REPUBLIC OF SERBIA

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### Abstract:

*The authors analyze the implementation of the concept of flexible use of airspace in the Republic of Serbia, which deals with problems related to airspace capacity. The problem of airspace capacity and air traffic that takes place in it was not seriously considered in Europe before the Second World War, due to the simple fact that the number of flights in that period was relatively small. Achieving this goal and solving the problem is being sought in a better organization of the airspace of Europe, which directly influences the organization and strategy of the development of the airspace of all countries in Europe and the Republic of Serbia (as a signatory and a member of international organizations dealing with traffic management and airspace organization). The concept of flexible use of airspace should provide a solution to this problem. The implementation of the concept requires some legal and organizational solutions, so a wider national concept is needed for a consistent implementation of the concept. The problems encountered by the creators of the concept in Europe and Serbia and the solutions that have been made are the subject of this paper. The content of the paper is presented through several questions to give an overview of the problem of airspace capacity and an increase expected in the upcoming period. The paper also deals with the division of airspace in the world and in our country; planning, registering and*

*announcing flights; the concept of flexible use of airspace; and the problems of applying the concept in Serbia.*

*Key words: concept, airspace, Republic of Serbia, European Union, international organizations, air transport.*

## Introduction

With the development of airline industry and the discovery of new types of aircraft engines and the modernization of aeronautical techniques, it was possible to cover large distances in a relatively short time. People began to intensively use air transport for various purposes. The development of tourism and modern business has had a direct impact on the rapid development of air transport. Air travelers arrive for a much shorter time at their destinations than travelers using road or water transport. The long-haul flights has become common and the number of users in air traffic has been constantly increasing. With the constant increase in the volume of air traffic, there was also a need for the adoption of certain specific laws and regulations that guarantee the safety and security of all traffic participants while at the same time facilitating the smooth flow and development of traffic. The aim of the paper is to show the influence of international treaties (signed by the Republic of Serbia) on the organization of the airspace above its territory and the necessity of defining a clear strategy for the development of the airspace of the Republic of Serbia. The ATM Air Traffic Management (ATM) has the data showing that, in the sky of Europe, there are about 26,000 flights daily on average. Forecasts indicate that the volume of air transport will double by 2020 (Eurocontrol. What is the Single European Sky, 2018), which makes traffic demands significantly larger than the capacity of airspace. An additional problem in the deployment of civilian air traffic is the activation of military zones in which military flying is carried out. When activating military zones, the airspace of the area covered is closed to civilian traffic, which as a result has a major decline in capacity in a certain part of Europe's airspace, because of the need for aircraft to be vectorized<sup>1</sup> around the military zones. (Službeni vojni list, 14/ 2018)

The ultimate effect of activating military zones is most often the introduction of air traffic control measures whose negative impact is manifested in the form of plane rerouting or delay (delay) on the ground

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<sup>1</sup> Radar guidance or vectorization is the use of radar data for determining the rate, speed and height of aircraft operations (or to determine the optimal route around the activated military zones in order to reduce delay in air traffic).

before taking off. Delaying the plane on the ground or its rerouting creates an additional cost to airlines. The fact that the activation of military zones creates major problems in air traffic is also evidenced by the fact that Eurocontrol<sup>2</sup> established a special department for civil-military cooperation dealing with the problem of flexible use of airspace by civilian and military aircraft (Eurocontrol. Civil-Military, 2018). Eurocontrol's main goal is to better utilize airspace capacity and reduce current flight delays in Europe's airspace.

### Airspace sharing

Today there are many different definitions of airspace. Sovereignty in airspace from the viewpoint of territorial integrity and state security is defined by international legal acts. The Convention on International Civil Aviation held on 7 December 1944, Part I, Chapter I, Article 1 defines: "States Parties recognize that each State has complete and exclusive sovereignty over the airspace above its territory" (International Civil Aviation Organization, 2006). This implies, on the one hand, sovereignty that is not shared with others, and on the other hand, the realization that it is a comprehensive sovereignty over land and the territorial sea. The military lexicon defines airspace as follows: "The airspace is the space around the Earth filled with air. The upper limit of the airspace is not legally defined. The smallest distance in the vertical plane is taken by the one that has the air and which allows the flight of aerodynamic aircraft. The airspace of the state is defined by a space in the vertical and horizontal plane above its surface (land, lake, river, inland sea waters and territorial or coastal sea), which forms part of its state territory and on which its sovereignty extends. The state of the air is inviolable. The entry into the airspace is regulated by the state and is authorized to prohibit it. Through international obligations, states take over the obligations to allow international traffic in their airspace" (Vojnoizdavački zavod, 1981). The Rules on the Flying of Military Aircraft of the Republic of Serbia (Službeni vojni list, 14/2018) and the Law on Air Transport of the Republic of Serbia in Article 4 define "airspace as the space above the territory of RS. The use of the RS airspace is available for all aircraft operating air transport, according to international acts, this law and other regulations" (Službeni glasnik RS, 66/2015). By the NATO definition, the airspace is a space above the territory and the territorial sea of a NATO member state. The

<sup>2</sup> The European Organization for the Safety of Air Navigation is an international organization, founded in 1963, the primary objective of which is the development of a continuous, pan-European air traffic management system.

Law on Air Transport and the Rules on the Flying of Military Aircraft of the Republic of Serbia do not define the upper border of the airspace.

The legal nature of the airspace is determined by the airspace over the land and water areas of the state and over it the state exercises sovereign power, and over the open sea there is a free airspace that is not subject to sovereignty of states. International law and internal law are based on the fact that the state has full and exclusive sovereignty in the airspace above its land and water area.

However, the authorities of a state are legally limited in exercising their territorial sovereignty by the obligation to provide other states with the opportunity to use the airspace in a certain way and under certain conditions. Thus, for example, the right for foreign aircraft to fly over is contracted, provided that it is not offensive and only in peace, that it is done by airlines of the Contracting States, and the home state prescribes rules on the acceptance of foreign aircraft, entry and exit corridors, air flying routes, for overflights, landing and landing aerodromes and a general safety regime on the basis of which it may require the landing of a foreign aircraft. In order for the traffic to run smoothly and prevent delays, i.e. to increase the capacity of the airspace, states resort to the signing of certain international agreements, which, in cooperation with Eurocontrol, are scientifically trying to solve problems at the national levels. The precondition for defining a new way of organizing airspace and applying scientific methods for increasing airspace capacity is to control that space.

### *Controlled airspace*

Controlled airspace "is a dimensionally defined airspace in which the control and "control of " the aircraft is performed by air traffic control, according to the visual and instrumental flight rules and in relation to the classified airspace. Controlled airspace is divided into several categories; there are classes "A", "B", "C", "D", "E", "F", and "G". The rule is that a flight must be announced and authorized by Flight Control (FC; in Serbian KL) with an adequate flight permit, from flight to landing, during the flight in the controlled airspace when flying by the instrument flight rules (IFR). During the flight, the transponder "mod C" or "mod S" must be on the plane. In this way, FC provides adequate separation of IFR-based aircraft. FC also provides separation and "guidance" of VMC-Visual Meteorological Conditions, which fly according to IFR rules. It is important to note that FC is not responsible for the separation of IFR-flying and those that fly by Visual Flight Rules under conditions without radar identification (Skybrary. Classification of Airspace, 2018). In Figure 1, we can see the airspace dividing chart.

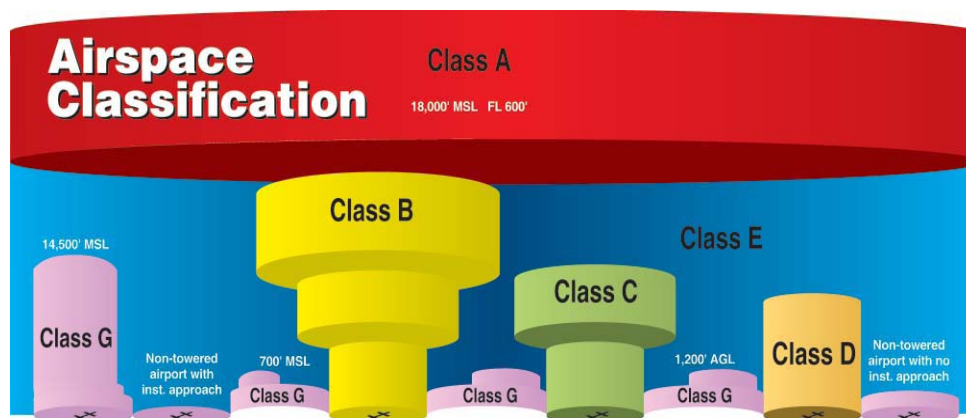


Figure 1 – Distribution of airspace by classes (Federal Aviation Administration, 2018)  
 Рус. 1 – Классификация воздушного пространства (Federal Aviation Administration, 2018)  
 Слика 1 – Подела ваздушног простора по класама (Federal Aviation Administration, 2018)

	Class A	Class B	Class C	Class D	Class E	Class G
Entry Requirements	ATC clearance	ATC clearance	Prior two-way communications	Prior two-way communications	Prior two-way communications*	Prior two-way communications*
Minimum Pilot Qualifications	Instrument Rating	Private or Student certification—local restrictions apply.	Student certificate	Student certificate	Student certificate	Student certificate
Two-Way Radio Communications	Yes	Yes	Yes	Yes	Yes, under IFR flight plan*	Yes*
Special VFR Allowed	No	Yes	Yes	Yes	Yes	N/A
VFR Visibility Minimum	N/A	3 statute miles	3 statute miles	3 statute miles	3 statute miles**	1 statute mile†
VFR Minimum Distance from Clouds	N/A	Clear of clouds	500' below, 1,000' above, 2,000' horizontal	500' below, 1,000' above, 2,000' horizontal	500' below,** 1,000' above, 2,000' horizontal	Clear of clouds†
VFR Aircraft Separation	N/A	All	IFR aircraft	Runway operations	None	None
Traffic Advisories	Yes	Yes	Yes	Workload permitting	Workload permitting	Workload permitting
Airport Application	N/A	• Radar • Instrument approaches • Weather • Control tower • High density	• Radar • Instrument approaches • Weather • Control tower	• Instrument approaches • Weather • Control tower	• Instrument approaches • Weather	• Control tower

\*Exception: temporary tower or control tower present  
 \*\*True only below 10,000 feet  
 † True only during day at or below 1,200 feet AGL (see 14 CFR part 91)

AGL—above ground level  
 FL—flight level  
 MSL—mean sea level

Figure 2 – Conditions for using particular airspace classes (Federal Aviation Administration, 2018)  
 Рус. 2 – Условия использования воздушного пространства в соответствии с классом (Federal Aviation Administration, 2018)  
 Слика 2 – Услови за коришћење одређене класе ваздушног простора (Federal Aviation Administration, 2018)

The "A" airspace class represents the limited air space from flight level FL 180 (FL-Flight Level) or 18,000 feet ( $\approx 6000$  m to FL 600 or 60,000 feet ( $\approx 20000$  m). All planes that fly to "A" "airspace classes must comply with the IFR flight rules, have the FC license for flight at that altitude and a height-adjustable altimeter at a standard pressure (QNE = 1013mbar / 760 mmHg), thus ensuring the required separation of planes at horizontal and vertical levels. VFR flights in the A-class airspace are not allowed. A-class airspace is used by aircraft that can fly at high altitudes and high speeds for flying between major cities. In order to enter that class, there must be an ATC Air Traffic Control, pilots must have the prescribed flight permit under such conditions, two-way radio communication is required as well as the monitoring and separation of the traffic and the advisory role of FC, while there are no requirements related to the airport (A class is limited to the altitudes from FL 180 to FL 600 and does not extend to the ground, Figure 1).

The "B" class of airspace is used around large airports and extends from ground to a height of 10,000 feet in some cases and more. At higher levels of the "B" class of airspace, the horizontal limit of FC liability may be greater than 15 nautical miles around the tower (Figure 1). Consequently, there is no universal provision of the "B" airspace class but it is formed on the basis of airport needs, and the volume of traffic at that airport and the geographical position of the airport itself. In class "B" of the airspace, flights of ultra-light aircraft are prohibited. The "B" class is remembered on the basis of the English slogan "Big City airspace", for the airspace above big airports, i.e. cities. For this class, there must be an ATC license, pilots must have the prescribed flight permit for such conditions, visual flying with a visibility of more than 3 miles is permitted, two-way radio communication is mandatory, FC has traffic monitoring and advisory role, and the airport is equipped with all the necessary tools for FC in that class (Figure 2).

The "C" airspace class - if "B" is for "Big Cities", then "C" is simply for "Cities". The spatial constraints of the "C" class are smaller than those for the "B" class (Figure 1), only flying by FC is permitted. The control tower in the "C" class is equipped with a radar for FC and can also control some smaller airplanes (which cannot belong to the D class). Ultra-light aircraft cannot fly in the "C" class without a special license issued by FC based on a phone call or a radio call. Cities that have the "C" class of the airspace are not big cities, but they have traffic with large planes and normal commercial flights. In order to enter this class, there does not have to be an ATC license, which pilots have after completed some degree of training, but students and trainee pilots can fly in that

class, two-way radio communication is mandatory, visual flight is allowed with visibility greater than 3 static miles and the prescribed distance from the clouds: horizontal 2000 fits, above the clouds is shifted to 1000 feet and below 500 fits, traffic monitoring and advisory role of FC is carried out, and the airport is equipped with all necessary means for FC in that class (Figure 2).

The "D" airspace class is used for small airports that have their own control tower. The "D" label explains the size of the airport (city) as "Diminutive" or "Dime-sized" (reduced, small). All commercial flights are permitted in this area, flight through this area must be announced and approved by the control tower (FC). Radio communication is required. Separation in this area is done by FC; such space (airport) is often used for training flights and training of young pilots. The dimensions of such a space are within the boundaries from the earth up to 2,500 feet high and about 8.6 nautical miles (10 static miles) around the tower.

The "E" class of airspace is a controlled space that is not included in "A", "B", "C", and "D" classes. The "E" class of airspace can be defined as "E" for "Elemental" or "Everywhere airspace" (adjacent, other airspace), and represents the space that starts from the surface of the earth or of some indicated height (heights based on which the airspace of the mentioned classes "A", "B", "C" and "D" is already occupied Figure 1) and the adjacent airspace (space between classes). For example: if an airplane is flying on an air path below 18,000 feet, it is in the "E" class. As the "E" class, a space between two terminal FCs at a height of 14500-18000 is defined. The class "E" of the airspace provides control of IFR-controlled airplanes to remain in a controlled airspace as well as the regulated separation of aircraft on the route.

The "F" airspace class is a space in which both the IFR and VFR rules can be applied. Separation in that area is performed by FC as long as it is practical and airplanes fly according to the IFR rules. Traffic information can be provided until the time FC finds practical in relation to other flights.

The "G" airspace class is an uncontrolled airspace in which VFR is applied. The "G" class of airspace can be defined as "G" for "ground". The upper limit of the "G" class is where the lower limit of the other classes is. This includes the entire airspace that is not defined by the above classes. No FC is provided in this area. To enter this class, there is no ATC license but only two-way radio communication, visual flight is allowed with visibility greater than 1 mile and without clouds, there is no separation performed by the tower, but by pilots themselves based on the traffic data obtained (Figure 2). This means that the only requirement



for a flight in that class is required visibility for the crew and its plane. Based on the signed international treaties, while respecting the specifics of the relief, shape and position of the country, the Republic of Serbia carried out the division of its airspace.

### *Airspace division in Serbia*

The airspace of the Republic of Serbia is divided into controlled and uncontrolled airspace. The Decree on Airspace Classes of the Republic of Serbia introduces C, D, and G classes and the conditions for their use (Službeni glasnik RS, 106/2013). The C class airspace is applied in a controlled airspace from the lower limits of the controlled airspace to flight level (FL) 660, except in controlled zones and airport traffic zones when they are active.

The D class airspace is applied in controlled zones during the operating hours of the air traffic control units responsible for providing services in the controlled zone except in the airport traffic zones when they are active.

The G class of the airspace is applied:

- outside the controlled airspace;
- above flight level (FL) 660;
- in all airport traffic zones up to the levels published in the Integrated Aviation Information Package, when those zones are active or up to the level approved by the competent air traffic control unit;
- in zones of sports activities, up to the levels published in the Integrated Aviation Information Package, when those zones are active.

VFR flying in the C, D and G classes of airspace is permitted if the following meteorological conditions are met:

- minimum visibility in flight:
  - o 8 km at and above 3,050 m (10,000 ft),
  - o 5 km below 3.050 m (10.000 ft);
- minimum distance from clouds:
  - o 1,500 m horizontally,
  - o 300 m (1,000 ft) vertically.

In the controlled zone, the competent air traffic control unit may grant a VFR flight (so-called special VFR flight) below the minimum prescribed in paragraph 1 of this Article at speeds of less than 140 kt IAS (Indicated Air Speed) in the following meteorological conditions: 1) minimum visibility in flight: 1,500 m (800 m for helicopters); 2) bottom base of clouds: 180 m (600 ft). Since it is a controlled airspace, an application for the use of a particular airspace or the use of a particular route must be recorded and properly processed. The entry and exit from the zone must be announced and reported to the competent air traffic control, as this is the only way to satisfy the needs of the users and control the capacity of the airspace. The mode of announcement and registration of flights is defined by each state separately, with respect to international agreements related to the standardization of the form of flight plans that are located at each airport flight control.

### Planning announcements and flight security announcements

Planning, announcing, reporting and securing flights of military and civil aircraft are carried out in accordance with certain regulations determined by the national aviation authority and must be in accordance with the signed international agreements (SMATSA, 2008). Such regulations regulate air traffic in a particular country. The planning regulates the modes, procedures and obligations of the air traffic control authority. Flight planning of military aircraft represents the actions and procedures of the competent authorities in the preparation and delivery of the flight plan to the competent air traffic control service. Civil Aviation Planning represents the actions and procedures of domestic and foreign air carriers and other civil aircraft owners or holders of the right to dispose of aircraft that are submitted to the Flight Control Agency in the form of flight plans or flight clearance requests. The flight announcement of the aircraft represents the actions and procedures of the flight control service on the receipt and distribution of the flight plan to participants in the provision of flying and the identification of aircraft in the airspace. Airplane flight recordings represent the actions and procedures of flight control services to provide information for the identification of aircraft to military authorities. The flight ID is an alphanumeric series of up to 7 (seven) characters, which enables all participants in the announcement process to register the aircraft identification in flight. Identification of aircraft in the airspace consists of the actions and procedures of flight control and military authorities in order to determine the belonging of

aircraft and compliance with the approved conditions for flight execution. Flight security is a set of measures and procedures undertaken in order to provide timely and complete security for the safe and efficient execution of flights. The flight registration recognizes: airport flying, out of the airport flight and overflight. Member States in international aviation organizations have pledged to clearly state their needs for occupying airspace at precisely defined time intervals by planning, announcing, reporting and securing flights.

By its membership in international aviation organizations, the Republic of Serbia has undertaken the commitments dictated by organizations such as ICAO<sup>3</sup> or the European Civil Aviation Conference - ECAC (Republic of Serbia is a member since 27 November 2002) and the European Organization for the Safety of Air Navigation - EUROCONTROL (Republic of Serbia is a member since 01. 07. 2005); also, by signing the Multilateral Agreement with the European Commission on the establishment of the "Common European Aviation Area" - ECAA<sup>4</sup> (Republic of Serbia has been a member since June 28, 2006), Serbia has undertaken the implementation of pan-European programs, goals and principles contained in the ATM Strategy 2000+ (Air Traffic Management - ATM Strategy 2000+).<sup>5</sup> Eurocontrol's European Sky Development Strategy is primarily designed and built because of:

- the expected increase in the requirements for the use of airspace of all groups of users (military aviation, naval and land forces, air carriers, general, agricultural and sports aviation),
- existing forecasts indicating a doubling of the volume of commercial air traffic by 2020 compared to 1995,
- inability of the existing air traffic management systems - ATM systems to satisfactorily provide growing demands. (Stanković & Petošević, 2012, pp.211-229)

The problems encountered by Eurocontrol were primarily related to the necessity of introducing numerous changes in the organization of

<sup>3</sup> In 2000, the Republic of Serbia renewed its membership in the ICAO International Civil Aviation Organization, which was interrupted by developments on the territory of the former SFRY in the 1990s.

<sup>4</sup> The legal basis for the integration of the Republic of Serbia into the European Union in the field of air transport is the "Multilateral Agreement on the Establishment of a Common European Aviation Area" (ECAA agreement) (Civil Aviation Directorate of the Republic of Serbia. Multilateralni sporazum, 2018).

<sup>5</sup> ATM Strategy 2000+ was adopted in January 2000, with the aim of improving air traffic management capabilities with a vision for the period up to 2020.

airspace and the organization of flights in it. Ensuring greater capacity for overflight traffic was the main obstacle in ensuring efficient use of the European airspace. The formed airspace structures at the national level are complex and diverse, so the evolution of Eurocontrol's airspace strategy for the ECAC member states aims to ensure simplification and harmonization. The planned national airspace development strategies cannot be developed in isolation, since each country is individually an integral part of the European system.

The strategic goal of organizing the airspace is to move, in proportion to the development of aircraft and increasing traffic, towards a unique organization of the airspace called Single European Sky - SES (Eurocontrol, What is the Single European Sky, 2018), which will represent one space for all ECAC members. In practice, this means that the entire airspace is not limited to national borders and provides maximum freedom for all users, with the required level of air traffic safety, without disturbing defense and security systems at the state level. In this context, a key mechanism recognized by the European Commission is the creation of a functional airspace that would be based on operational requirements for airspace management, regardless of national boundaries. The main project for achieving this goal is the implementation of the Flexible Use of Airspace (Eurocontrol. Flexible Use of Airspace, 2018) fully, without limitations. The program objectives of the airspace strategy are:

- "development of new customized airspace structures that will better respond to the requirements of the users for the provision of air traffic,
- achieving the unique application of airspace structures and classification in Europe,
- increasing the freedom of movement for all users of the airspace, and
- application of the existing improvements in the use and introduction of new ones" (Stanković & Petošević, 2012, pp.211-229).

Eurocontrol has recognized the importance of the new organization of airspace in the domain of economy and the impact on the overall quality of life of citizens using flight services. The freedom of movement of people and goods, the development of traffic and the increasing demands of the military for the ever-increasing allocation of large areas of airspace for training and training flights, inevitably leads to a new organization of airspace and flight rules related to separating and monitoring aircraft. In the space where requests for its use are increasing

every day, and the organization responsible for its distribution (use) has no possibility to increase it, the issue of the safety of all users is put in the first place. Flying safety is a fundamental issue in all organizations dealing with flying, from air carriers to the military. Eurocontrol and national aviation authorities (civil and military) are expected to meet safety requirements, while the security aspect of air traffic control and its organization should be implemented by clearly defining carriers of specific areas and identifying responsibilities. The needs of national defense and protection must be a priority. The Republic of Serbia is determined to actively cooperate in international frameworks, thus confirming its desire to build peace and stability in Europe. In achieving the goals of national security, the Republic of Serbia has been determined to apply the concept of cooperative security within the framework of European security structures, as well as within other regional security associations. By signing international treaties, the Republic of Serbia has the obligation to train and prepare civil and military structures to fulfill obligations in the area of defense and airspace management, which must meet both national and international security requirements. Both the demands of the army and the demands of the civil sector can be met by flexible airspace management which will harmonize the requirements of different user groups. The concept of flexible use of airspace is imposed as a solution to increase the capacity of the airspace. The basis of the concept lies in the tendency that the airspace is no longer defined as purely military or purely civilian, but viewed as unique and flexibly used on a daily basis (Eurocontrol. Flexible Use of Airspace, 2018). Accordingly, any segregation of the airspace for a particular purpose will be of a temporary nature.

### The concept of flexible use of airspace

The concept of flexible use of airspace is designed to provide maximum flexibility in the use of airspace for the ECAC countries, where airspace is considered as one continuum to be allocated to users based on their daily needs (Eurocontrol. Flexible Use of Airspace, 2018). Each separation of airspace is temporarily based on the use of that space in real time and within a defined time frame. The airspace size is not limited to national boundaries. The difference in the use of airspace between civilian and military aircraft is high. Military aircraft as well as civilian ones transport goods and passengers from point A to point B, but also have far more demanding and complex exercises in which the use of airspace for altitude changes and flight speeds is multiple and is realized in a very

short time interval (training flights of combat aviation, air defense flights, training group flights, individual and group overflights to other airports, air patrols, humanitarian flights related to the evacuation of the population, search and rescue, fuel feed in the air, parachute jumping and freight throwing, supersonic interception, flight at low level by day and night, reconnaissance flights, radar interception and interception of aircraft without visual contact).

The challenges that arise in the implementation of the concept of flexible use of airspace are primarily reflected in the levels of planning the use of a particular space. Within the concept, the use of airspace is planned and divided into three organizational levels:

- "Level 1 is strategic; planning is done on a yearly and monthly basis. It is made on the basis of earlier plans and traffic from previous years. It is strategically planned to take over the airspace with conditional routes (CDR - Conditional Route) and the zones that were active in the last year. The plan is based on the structure of the airspace and the envisaged air traffic for that period.
- Level 2 is pre-tactical; planning is done from seven to one day in advance. Data is received up to seven days in advance and distributed to the main Eurocontrol management in Brussels. The day before the planned activities, the requirements for activating the zones are submitted. In Brussels, the incoming requests are analyzed and based on the priority, dislocation and relocation of a part of air traffic is done. With this, the airspace is dislocated from 06:00 h on the day of the start of the activities related to the occupation of the airspace until 6:00h the following day.
- Level 3 is tactical; planning and coordination are carried out on the day of execution. These are changes that happen early in the morning, such as the cancellation of certain zones or some other changes related to already announced flight restrictions, which are important for the smooth flow of traffic. Changes that take place must be made until 9:00 am, local time, to the main air traffic control center in Brussels. After that, all the changes that are taking place, and are related to changes in the airspace, are resolved at the tactical level between civilian and military flight controllers." (Eurocontrol. Flexible Use of Airspace, 2018)

Flight controllers implement the scenario provided for in the operational plan and instruct pilots to strictly observe the planned and displayed flight plans. Under normal conditions, there is no need for a flight controller to react in order to further fill in flight plans because they have already incorporated all real changes that can be made based on the operator's options and wishes and the actual situation that the system offers based on all existing restrictions. Conditionally, if the data sent and come via the data delivering link become interesting / usable for all users, the execution phase will be further developed and real-time changes on the flight paths will be possible.

The next challenge faced by the creators of this concept was the implementation restrictions in the ECAC countries. The limitations were different and depended on many factors that were neither standard nor the same for all countries. The difficulties in implementing the concept were directly influenced by incomprehensible manuals that were supposed to simplify the introduction of the concept into operational use. Eurocontrol annually reported to the Member States on the degree of implementation of the concept (Hallgren, 2009). The main implementation difficulties were primarily related to non-standard space (geographic size and position of the country) in which the implementation of this agreement should be implemented and the FC system unified. Historical circumstances in these countries and their relationships with neighbors had direct influence, and the implementation also depended on current political circumstances that dictated the pace of the implementation of that agreement through the institutions of a particular country. Requests issued by the military for airspace needs in each country were different, with the direct impact of the military's technical equipment and the ability to monitor air traffic. The regulations related to the constraints and division of airspace in each country are different and depend on the national interest of that country and the professional staff who carried out the division of the airspace. The organization of the civil-military cooperation at the national level had a direct impact on the speed at which the coordination of the two systems that control airspace was coordinated. The most important factor that had a direct impact on the standstill in the implementation of the concept was the money that every state should set aside for the creation of institutions and the introduction of certain standards in order to better communicate with all factors controlling the European sky.

The problems that have arisen at the strategic level (Hallgren, 2009):

- The procrastination of the activities that took place nationally in the creation of new or merging already existing institutions into the functional units required by the concept (unified civil and military structure).
- The absence of agreed meetings for the regulation and adoption of acts and rules on the allocation and use of airspace between the states (border zone of the flight).
- Direct dependence on the level of civil / military co-operation achieved at the national level.
- Some countries based the whole concept on "fixed" airspace, which is a contradiction to the concept itself. The goal was to get one continuum from one created sky, which everyone would use according to their needs (both civilians and the army).
- Approach that the tools developed to improve the work of the concept itself were used to solve problems that only occurred at the tactical level.

The problems that have arisen at the pre-tactical level:

- Inability to see all the needs related to the use of air routes.
- Lack of data on the traffic flow and the needs of the army for flying.
- Lack of common air traffic information related to the technical support of a particular country (radar systems, aircraft equipment, etc.).
- Limited capabilities of the air routes themselves (based on the geographical location of a country) for changes in flight elements during the flight.
- Restrictions related to the timetable for using a particular route or zone. When it comes to commercial flying, the needs for new airways and cancelled zones above (through) which traffic can be directed come relatively late, i.e. the army is late in announcing the release of some of the zones. The request from the military authorities for the release of these zones is requested several hours in advance, which is too early for them since they do not have information from their commands whether there have been some changes.
- Co-operation and data exchange with the FC flow management is limited.
- There was a conflict of interest in the use of conditional routes - civilian aircraft require permanent and stable routes, while military aircraft require flexible routes that can be changed and adapted to their needs.
- The airspace clearance is not standardized in all ECAC countries. It arises from direct needs of civilian and military aircraft, and such displacement was not possible beyond all state borders as planned.



The problems that have arisen at the tactical level:

- There was no good classification and definition of airspace in certain ECAC countries.
- The pre-tactical plan was unrealistic for execution.
- Adequate data on the spread of the concept was not available.
- Poor civil / military cooperation and coordination.
- Traffic management at the tactical level was limited.

In addition to all the challenges encountered by the creators of this concept, the implementation perspective has not been called into question. Forecasts that are realistic about increasing air traffic in the coming years do not leave much room for airspace designers to handle it. The benefits of the concept are reflected in better organization and better planning of airspace use. Based on the data provided by the manager of Eurocontrol Anders Hallgren (Hallgren, 2009), only for 2008, using the FUA concept (coordination at pre-tactical and tactical levels using conditional routes) reduced fuel consumption by 108,000 tons. With a better airspace organization (without waiting on the ground and rerouting), companies saved 87 million euros, while reducing carbon dioxide emissions by 340,830 tons. If we know that from year to year the number of flights is constantly increasing, it is easy to predict the size of the savings achieved by the introduction of such a system. The desire to base the airspace on a single continuum that is not burdened with national borders allows further development of aviation and air traffic. It provides users with maximum freedom in planning and using airspace. The concept as such makes it clear that everyone in the air is equal and that the use of airspace is available to everyone, but only as much as it is necessary for the execution of planned tasks and flights. The accent is also placed on finding such airspace that is not too much burdened by traffic so that it can provide adequate space for training for military aviation (space along state borders). The fact is that even though all countries signed an agreement and embarked on the implementation of the concept through European Commission Regulations, (EC) No 549/2004, 550/2004, 551/2004, 552/2004 and 2150/2005 (Official Journal of the European Union, 2005) on the rules for implementation of the concept, the concept did not come to life in all countries at a satisfactory level. One of these countries is Serbia where its geographical position, historical and political circumstances (Kosovo and Metohija and Bosnia and Herzegovina), technological equipment and, finally, the most important factor, money, have slowed down the implementation of the concept to the full extent.

### *Implementation of the concept of flexible use of airspace in Serbia*

The problems of implementing the concept of flexible use of airspace in Serbia had all of the stated characteristics (problems) of the implementation of the concept in Europe. Defining regulations at the national level, while respecting all constraints of one's own airspace and the airspace of neighboring countries (arising from the geographical position and the size of the country itself), had to be in line with the rules and regulations in the world. The process of the implementation of the concept in the Republic of Serbia (Službeni glasnik RS, 69/2011) is divided into the preparatory period and the period of introduction as in all European countries (Eurocontrol, 2003, p.3). During the preparatory period, the Republic of Serbia was supposed to:

- form the (National) Airspace Committee which will be responsible for the introduction of the concept,
- review the management of FC in the environment (ATM-Air Traffic Management environment),
- translate the concept into a national plan with the consent of the relevant civil and military authorities,
- prepare all functions, necessary procedures, including coordination and negotiation processes,
- prepare appropriate communication tools that will enable the implementation of the concept at all three levels (levels 1, 2 and 3).

During the implementation of the concept, states should activate all procedures and functions necessary for the operational execution of the procedures at three levels of FC (ACM-Airspace Control Measures). The minimum requirements to be fulfilled by the Republic of Serbia are given in Table 1.

Table 1 – Minimum requirements for the implementation of the FUA concept (Eurocontrol, 2003, p.10)

Таблица 1 – Минимальные требования для осуществления FUA концепции (Eurocontrol, 2003, p.10)

Табела 1 – Минимални захтеви за имплементацију FUA концепта (Eurocontrol, 2003, p.10)

1	Adoption of the FUA concept by the state Translation of the FUA concept into a national plan for the consent of the appropriate civilian and military authorities	REC 1 p.8
2	Information process Start the process of informing about the FUA concept as soon as possible in order to familiarize all interested parties with it before its implementation, including the publication of the AIC	REC 2 p.8
3	Establishment of the National Airspace Committee at level 1 Joint civil / military body responsible for implementing the concept and defining the strategy of ACM policy at level 1	ACM HB para 3.2 & 3.5.
4	Assessment of the current airspace and routing structure and the introduction of flexible airspace structures In the upper airspace and, where applicable, in the terminal area, establish manageable spaces in accordance with the accepted harmonized / coherent routing network	ACM HB para 3.3; 3.4; 3.7; 3.8 & 6.3.
5	Publication of the FUA structure Publication of the FUA structure in the national Air Area	ACM HB para 7.1 & 4.6.3.
6	Introducing the software or the contact point Establish an official civil / military center for airspace management to manage flexible airspace structures where they exist, and where they do not, a focal point for international coordination at level 2	ACM HB para 4.5
7	Introduction of the software into the FC system Official request from the FC Director in Brussels to install a terminal with the software followed by the training of the FC staff	ACM HB para 4.5.
8	Identification of AA Establishment of units, called Approved Agencies (AAs), authorized by the national authorities to submit requests for airspace, negotiate and use the allocated airspace by FC	ACM HB para 4.2.

9	Education about the FUA functions at level 2 FC training based on the expected traffic forecasts	ACM HB para 4.3.
10	Establish a link between all concerned parties at level 2 Ensure that appropriate means of communication are in place between all stakeholders in FC (from the strategic level to the tactical level)	ACM HB para 7.2.
11	Establishment of the FC procedures at level 2 Ensure that the coordination procedures and the negotiation process are in accordance with the FUA on-site work schedule	ACM HB para 4.7
12	Implementation of the real-time coordination procedures at level 3 Provide procedures for civil / military, controller to controller, real-time coordination, adopted by civil and military authorities and published in the Letter of Agreement-LoA.	ACM HB para 5.2.
13	Upgrading the FC (ATM) system at level 3 Upgrade the ATM tools and communication devices between civilian and military ATC providers to facilitate: -Direct controller-controller communications using a direct telephone line - automatic exchange of flight data from civilian to military controllers, including the position and intent of GAT -providing national and international data on the usability of the airspace (CBA) to the staff of respective controls using telephones and faxes -use of the airspace circulation function based on a direct means of communication (telephones)	ACM HB para 5.4.

The challenges of the implementation of the concept in Serbia were primarily related to the lack of a clear organization that manages the airspace (it has already been said that Serbia has renewed its membership in the European Organization for the Safety of Air Navigation - EUROCONTROL, 2005). In that period, there were two state organizations in Serbia that dealt with the organization of the airspace:

- at level 2, there was the Civil Aviation Directorate (established on January 1, 2004) (Civil Aviation Directorate of the Republic of Serbia. About the Civil Aviation Directorate, 2018) and

- at level 3, there was the Serbia-Montenegro Air Traffic Services Agency (SMATSA) state agency for airspace control services in the airspace of Serbia and Montenegro (established on December 29, 2003) (SMATSA. General overview, 2018).

In that period, there was no organizational unit in Serbia that would deal with the strategic management of the airspace of the Republic of Serbia. Such an organizational unit should contain unified civil and military processes within the (National) Airspace Committee. At level 2, there is the Civil Aviation Directorate (CAD), but there is no military aviation authority that solves the problems of military aircraft related to normative-regulatory and operational-control functions (what CADs were doing for civil aircraft). At level 3, there is the Flight Control of Serbia and Montenegro, but there is no organizational unit from the army that should deal with the activities in Table 1 (real-time allocation, activation and deactivation of the airspace, solving specific FC problems and traffic situations between civilian and military air traffic controllers, etc.). However, the problem that required an urgent solution was the delay in Europe's airspace which caused the activation of the TSA-01 military zone (Temporary Segregated Area), shown in Figure 3.

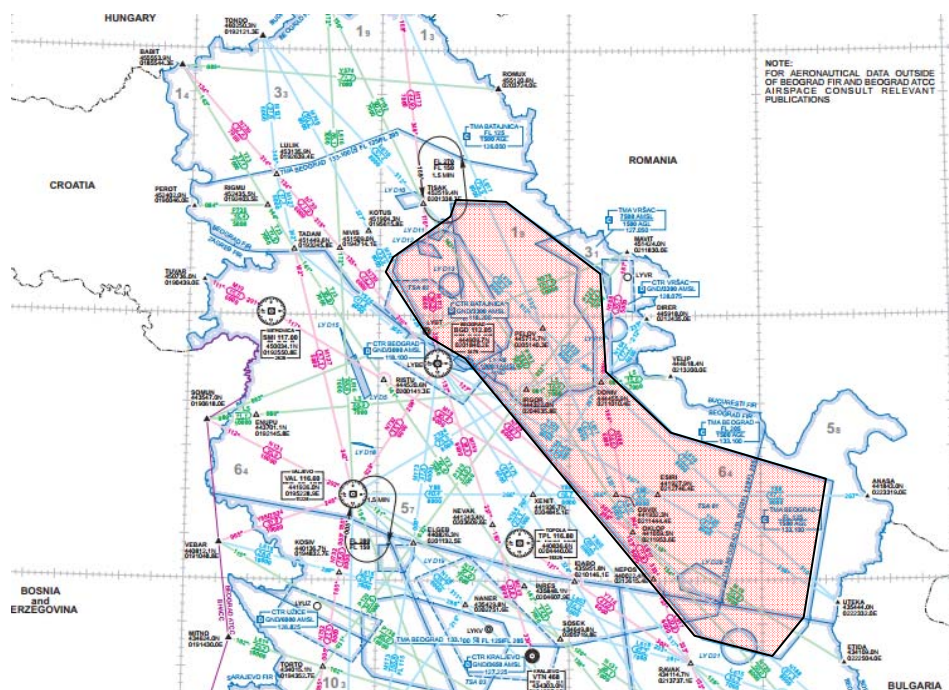


Figure 3 – Map of the air routes in the Republic of Serbia (SMATSA. Map of the lower level of the air routes in the Republic of Serbia)

Рис. 3 – Карта воздушных трасс Республики Сербия (SMATSA. Карта низкого эшелона воздушных маршрутов Республики Сербия)

Слика 3 – Карта ваздушних путева у Републици Србији (SMATSA. Карта nižeg sloja vazdušnih puteva u R. Srbiji)

The seizure of the zone and its non-use by the Serbian Armed Forces (Air Force and Air Defense) caused delays in air traffic in the southern part of Europe. Based on the data obtained from the SMATSA Control Agency (Appendix no. 1 from 2004 to 2007), the size of the generated delays caused by the activation of the military zone can be seen. Generated delays were the reason why Eurocontrol insisted that an adequate solution be found for this problem. Table 2 shows the data for the caused delays in 2008.

Table 1 – (Pečenković, 2008)

Табела 1 – Активација зоне TSA-01 (Pečenković, 2008)

Табела 2 – Activation of the zone TSA-01 (Pečenković, 2008)

	datum	br notama	време рада зоне	I	II	br notama C	I kasnjenje minuta	II kasnjenje minuta	ukupno kasnjenje minuta	broj aviona pod restrikcijom I	broj aviona pod restrikcijom II	ukupno broj aviona pod restrikcijom
1	15.01.08.	A0044	11:30-12:30	CNL		A0045			0			0
2	16.01.08.	A0046	11:30-12:30	?					0			0
3	17.01.08.	A0047	09:00-09:30	CNL	CNL	A0048/16.01.			0			0
4	23.01.08.	A0049	11:00-11:30	CNL		A0051	11		11	2		2
5	24.01.08.	A0052	11:00-11:30	✓			9		9	1		1
6	01.02.08.	A0069	11:00-11:30	✓	CNL		140	64	204	6	3	9
7	09.02.08.	A0080	11:00-13:00	CNL		A0081	37		37	2		2
8	11.02.08.	A0082	12:00-14:00	CNL		?			0			0
9	12.02.08.	A0086	09:00-10:00	✓	✓		0	0	0			0
10	20.02.08.	A0088	09:00-09:30	✓	CNL		0	75	75	0	7	7
11	27.02.08.	A0111	10:00-11:00	✓			135		135	5		5
12	07.04.08.	A0187	10:00-11:00	✓			5		5	1		1
13	08.04.08.	A0189	08:00-09:00	CNL	CNL	A0193			0			0
14	08.04.08.	A0194	11:00-12:00	✓			73		73			0
15	11.04.08.	A0205	11:00-12:00	CNL		A0208	45		45	3		3
16	12.04.08.	A0211	09:00-10:00	CNL		?	61		61			0
17	14.04.08.	A0217	10:00-11:00	✓			150		150	7		7
18	15.04.08.	A0218	12:00-13:00	✓			69		69	6		6
19	16.04.08.	A0220	11:00-12:00	CNL		A0221/15.04.			0			0
20	07.05.08.	A0255	08:00-09:00	✓?			53?		0	1		1
21	07.05.08.	A0256	09:00-10:00	✓			37		37	2		2
22	28.05.08.	A0295	09:00-10:00	✓			39		39	1		1
23	04.06.08.	A0300	16:00-17:00	CNL		A0305	0		0			0
24	05.06.08.	A0303	10:00-11:00	✓			0		0			0
25	06.06.08.	A0308	10:00-11:00	CNL	CNL	A0313/05.06.	0		0			0
26	03.10.08.	A0604	08:00-08:30	CNL	CNL	A0607	0		0			0
27	06.10.08.	A0613	08:00-08:30	✓	CNL		26		26	2		2
28	08.10.08.	A0623	10:00-10:30	✓			114		114	11		11
29	09.10.08.	A0626	09:30-10:00	✓	CNL	A0631	0	25	25	0	1	1
30	13.10.08.	A0635	10:00-10:30	✓			21		21	4		4
							972	164	1136	54	11	65
			✓	18	47%							
			CNL	20	53%							
			UKUPNO	38								

Table 2 shows the dates of the activation of the TSA-01 zone by the Serbian Armed Forces. The section *datum* (the date) gives the days when the zone was activated by the Serbian Armed Forces for the period

from January to October 2008. In the NOTAM<sup>6</sup> number section (*broj notama*), the NOTAM numbers by which the zone is activated are registered (based on the number of the NOTAM, the work plan in the zone, the zone activation time and the height reserved by NOTAM can be checked). The zone activation time represents the time period in which the zone is occupied; by one NOTAM, two different time periods of the zone can be activated (January 17, 2008, number A0047 from 09:00 to 09:30 and by the same NOTAM the activated zone for the period from 11:00 to 11:30; the same is the case for the days of 01.02.2008, 20.02.2008, 08.04.2008, 06.06.2008, 03.10.2008, 06.10.2008, and 09.10.2008). The columns presented in Roman numerals "I" and "II" indicate whether the flight was executed (marked with "√") or not (canceled by "cancel - CNL"), for the first zone activation period and for the second zone activation period. On February 1, 2008, February 20, 2008, October 6, 2008 and on October 9, 2008, the flights in the first zone activation period were executed while they were canceled for the second period. Such cases occur when one-day flights are performed at supersonic speeds (Ma-2,05) and high altitudes (H>20.000m) - such flights are performed after the replacement of the engine on airplanes. It is often a case that some flaws are found on the plane after the first flight, making it impossible to go to the ceiling of the flight, and that is why the second flight is canceled. The *broj notama C* section (NOTAM number C-cancel) contains the NOTAM numbers with which the annulment of the already published NOTAM that activates the TSA-01 zone is entered. A new NOTAM again allows flying over our country. The table also shows cases with a date besides the published NOTAM which means that the SA canceled the published NOTAM the day before (24 hours earlier it was found out that the plane would not be ready for the flight because of its technical conditions) that activated the TSA-01 zone. In practice, this means that the originally published NOTAM was not activated on the specified date and had no impact on the traffic flow. Such an example can be seen for the day of January 17, 2008. when the zone was activated by NOTAM A0047, but the day earlier on 16.01.2008 it was deactivated by NOTAM A0048. For the days when there is no date next to NOTAMs that deactivate activities in the TSA-01 zone, it means that the flight was canceled due to adverse weather conditions or a technical fault had been identified before or during the takeoff. In sections / *delay*

<sup>6</sup> NOTAM - Notice to Airmen is a notice submitted by the authority responsible to Air traffic control to warn pilots with potential risks along the flight route or at a location that could affect flight safety.

*in minutes, II delay in minutes, and total delay in minutes*, there is the data on the additional aircraft retention on the ground from their planned take-off times (start of the engine). The delay times are generated by the software in Brussels thus minimizing the total delay caused by the activation of the TSA-01 zone. "I minute delay" and "II minute delay" refers to the total time of the zone operation and whether the zone was activated twice in one day. "Total delay in minutes" represents the sum of the first two delay sections and shows the size of the delay in one day caused by the activation of the TSA-01 zone. The table shows that for the days when the zone was deactivated on time (24 hours earlier) there were no delays (January 17, 2008, April 16, 2008, and June 6, 2008). The sections *the number of aircraft under restriction I, the number of aircraft under restriction II, the total number of aircraft under restriction* give the values of the number of aircraft that are covered by the delay, i.e. the number of aircraft assigned to some delay time. We see that the regulation of the airspace does not have to have an impact on the air traffic above our country - for the indicated dates (on 12.02.2008, 20.02.2008, 05.06.2008, and 09.10.2008) the activation of the zone did not have any impact on the planned traffic. But on October 8, 2008, the use of the zone had an impact on 11 aircraft which were included in the restriction, resulting in a total delay of 114 minutes. In all other cases, the number of aircraft covered by the restriction was in the range from 1 to 7. The total delay of 1136 minutes or almost 19 hours refers to the given period, with the use of the zone for 30 minutes. From the summary in the additional table shown below Table 2, it can be seen that the zone was used only 18 times for 30 minutes each time, a total of 9 hours. Using a zone of only 9 hours causes a delay of 19 hours. For each hour of activation of the zone on the European sky, a delay of two and more hours is caused. In order to stop this practice of creating "delays" in the sky of Europe, it was necessary to find an adequate solution that would satisfy all stakeholders.

Serbia had to respect the signed international agreements. After the meetings of the Serbian Armed Forces (Air and Air Forces) and SMATSA, a proposal was made to establish a department for civil-military cooperation at level 3. In early 2006, under the Command of the Air and Air Forces on the premises of SMATSA, a Department for the control, protection and allocation of airspace was established. This department deals with the allocation of airspace at the tactical level (level 3). This department is in charge of contacting the Eurocontrol Network Manager in Brussels responsible for monitoring the capacity and flow of air traffic at the European level. By establishing this department and coordination



at the tactical level, Serbia has entered the ranks of countries that have effectively applied the concept of flexible use of airspace.

The obligation to establish the National Air Level Committee at level 1 (a joint civil / military body responsible for the implementation of the concept and the definition of an airspace management strategy) was met in 2013. Bearing in mind the need for changes to include the function of civil-military coordination in the management and allocation of the airspace, in accordance with the signed European Common Aviation Area Agreement, the Government of the Republic of Serbia adopted Decision no. 02-10323 / 2013 (Službeni glasnik RS, 106/2013) which established the National Aviation Committee responsible for the strategic management of airspace. It is competent to provide efficient airspace management at the strategic level, ensuring that the use of airborne structures and routes is carried out in a safe and efficient manner by respecting the requirements of all airspace users.

The Directorate of Civil Aviation (DCA) is "an organization that is responsible for issuing regulations and first instance administrative acts, issuing public documents, keeping records, auditing aircraft operators, participating in the work of international aviation organizations and institutions and their working bodies and cooperating with competent authorities of other countries in the Republic of Serbia". The DCA in the Republic of Serbia represents level 2, airspace management.

With this analysis of the formed organizational entities and units (National Aviation Committee - Level 1, Civil Aviation Directorate-Level 2 and SMATSA and Air Traffic Control, Protection and Allocation Department-Level 3), the impression is that Serbia has rounded up the process of forming a structural and a legal framework for the smooth implementation of the concept of flexible use of airspace in the sky of Serbia. The process of implementing the concept of flexible use of airspace has not yet been fully completed, and work is still under way to link all levels into one functional entity. In order to solve the problem adequately, it is necessary to establish a Military Aviation Authority in the Republic of Serbia. The first indication that Serbia is heading in the right direction is the fact that the problem of airspace capacity is getting the attention of the decision-makers in the Serbian Government. The fact that the Government of Serbia has adopted a Conclusion on determining the national airspace management policy of the Republic of Serbia is a serious fact that the problem is seriously understood. The Conclusion confirmed the attitudes towards establishing: "organized, efficient and integrated airspace planning and management, as a common resource for all categories of users, which is used in a flexible and transparent

manner, while taking into account the needs of defense and security, environmental protection and obligation arising from confirmed international agreements, membership in international aviation organizations and international standards and recommended practices" (Službeni glasnik RS, 8/2014). The upcoming activities will show whether this Conclusion was a list of wishful thinking or a list for resolving the problem of airspace organization in Serbia and the desire to implement the concept in the sky of Serbia to the full extent.

### Conclusion

The needs expressed for the use of airspace are far greater than the current capacity of airspace in Europe. Growing needs have imposed a completely new approach in understanding and organizing airspace as a space where numerous activities are carried out by various users. To this end, new air quality standards have been established by the organization responsible for the airspace of Europe (Eurocontrol in Brussels) and new strategies have been developed that differently define the organization and management of the airspace in the sky of Europe. In addition to the Single Sky Europe and the ATM 2000+ strategy, a very important European airspace program is also the concept of Flexible Use of Airspace as a program that is a prerequisite for achieving all other strategies, concepts and programs. The paper presents how to implement the concept of flexible use of airspace in Europe and the Republic of Serbia. It was concluded that the concept has not yet been completed in all European countries. All the countries of Europe have common problems such as problems of non-standard airspace, historical and political circumstances, technical equipment of the army and poor civil-military cooperation, but in the first place in all European countries there is money as the main reason why the concept has not yet been applied and come to life in the sky of Europe. The concept has proven that only a scientific approach to addressing airspace capacity can help airline companies to save by reducing fuel consumption, carbon dioxide emissions, airborne delays on the ground, or rerouting. Serbia has created a legal framework for the implementation of the concept and has started with the formation of organizations that would be responsible for the concept. In Serbia, there are: National Aviation Committee - level 1; Civil Aviation Directorate - level 2; SMATSA and Airspace Control, Protection and Allocation Department - level 3. A problem that has not yet been solved is the absence of an aviation military authority that would perform normative-regulatory and operational-control functions (what the CAD does in civilian affairs).

The result of this paper is also the understanding of the impact of the signed international agreements on the development of the airspace of the Republic of Serbia through observation and deliberate clarification of the significance of the implementation of the flexible use of airspace in Serbia.

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#### ВЫЗОВЫ ПРИ ВНЕДРЕНИИ КОНЦЕПЦИИ ГИБКОГО ИСПОЛЬЗОВАНИЯ ВОЗДУШНОГО ПРОСТРАНСТВА В РЕСПУБЛИКЕ СЕРБИЯ

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#### Резюме:

В данной статье представлен анализ концепции гибкого использования воздушного пространства, делая особый акцент на вызовы при ее внедрении в Республики Сербия, учитывая все

проблемы, связанные с размером и границами воздушного пространства. Надо подчеркнуть, что проблемой размеров и границ воздушного пространства, также как и вопросами воздушных маршрутов до Второй мировой войны в Европе никто всерьез не занимался, по причине малого количества полетов в те времена. В качестве решения настоящей проблемы авторы данной статьи предлагают улучшение организации воздушного пространства Европы, что напрямую влияет на организацию и стратегию развития воздушного пространства всех европейских стран, в том числе и Республики Сербия (как члена и подписчика международных организаций, которые занимаются управлением авиамаршрутов и организацией воздушного пространства). Концепция гибкого использования воздушного пространства должна решить эти проблемы. Однако для внедрения вышеупомянутой концепции требуется пересмотреть раннее законодательские и организационные нормативы, и соответственно первоначально достичь национального консенсуса, в целях последовательного внедрения данной концепции. Проблемы, с которыми столкнулись создатели концепции в Европе и Сербии и решения, которые могут помочь решить эти проблемы представлены в настоящей работе. Структура работы была организована в виде ответов на многие ключевые вопросы по данной тематике, приведен обзор проблем, связанных с размером и границами воздушного пространства и улучшенных перспектив, которые ожидаются в ближайшее время; приведена сопоставительная классификация воздушного пространства; а также методы планировки, регистрации и объявления о полете, описана концепция гибкого использования воздушного пространства и освещены проблемы при ее применении в Республике Сербия.

**Ключевые слова:** концепция, воздушное пространство, Республика Сербия, Евросоюз, международные организации, авиамаршруты.

#### ИЗАЗОВИ ИМПЛЕМЕНТАЦИЈЕ КОНЦЕПТА ФЛЕКСИБИЛНОГ КОРИШЋЕЊА ВАЗДУШНОГ ПРОСТОРА У РЕПУБЛИЦИ СРБИЈИ

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ОБЛАСТ: ваздушни саобраћај

ВРСТА ЧЛАНКА: стручни рад

ЈЕЗИК ЧЛАНКА: енглески

**Сажетак:**

У раду је анализирана имплементација концепта флексибилног коришћења ваздушног простора у Републици Србији, који се бави проблемима који се односе на капацитет ваздушног простора. Пре Другог светског рата капацитет ваздушног простора и авио-саобраћај који се одвијао у њему није озбиљније разматран у Европи, због чињенице да је број летова у том периоду био релативно мали. Данас се тражи да се ваздушни простор Европе боље организује, што директно утиче и на организацију и стратегију развоја ваздушног простора свих земаља у Европи, па и Републике Србије (као потписника и члана међународних организација које се баве управљањем саобраћаја и организацијом ваздушног простора). Концепт флексибилног коришћења ваздушног простора треба да да решење за тај проблем. Његова имплементација захтева нека законска и организацијска решења, па је неопходан шири национални консензус. Проблеми са којима су се сусрели творци концепта у Европи и Србији и решења која су донета предмет су овог рада. Садржај рада изложен је кроз неколико питања: дат је осврт на проблем капацитета ваздушног простора и повећање које се очекује у наредном периоду; приказана је подела ваздушног простора у свету и код нас; описан је начин на који се врши планирање, пријава и најава летова, као и сам концепт флексибилног коришћења ваздушног простора и проблеми који се јављају при примени концепта у Србији.

**Кључне речи:** концепт, ваздушни простор, Република Србија, Европска унија, међународне организације, авио-саобраћај.

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