Consulting services for the elaboration of Cost Benefit Analysis and the Business Case for the Danube FAB functional airspace block covering the airspace of the Republic of Bulgaria and the airspace of Romania

Business Case Final Report






ALG TRANSPORTATION INFRASTRUCTURE & LOGISTICS

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1 Executive Summary

The DANUBE FAB Business Case is aimed at providing a detailed analysis of the impacts of the creation of the FAB on the stakeholders affected. It takes as main inputs the quantitative figures from the Cost Benefit Analysis and puts them in the overall context of FAB implementation, considering qualitative impacts on transversal areas such as safety, environment, security, human resources and social dialogue.

The main objective of the analysis is provide the decision makers with additional elements to assess the scope, complexity and performance improvements offered by different options for FAB implementation, providing the rationale for identifying the most suitable one from among other options, as well as a comprehensive assessment of the related benefits, costs, risks, mitigating measures and critical success factors.

This extends the analysis provided by the CBA in terms of impacted stakeholders, since besides ANSPs and Airlines also Militaries, General Aviation, NSAs, Airports are included in the analysis by assessing in a qualitative way the impact experienced by them.

The impact of the DANUBE FAB establishment on all the 11 ICAO Key Performance Areas is provided, showing positive results in each and all of them. This is mainly due to the extensive collaboration activity undertaken by DANUBE FAB partners during the last years, which has allowed to cover all aspects of operations by identifying the opportunities stemming from the FAB establishment and taking the appropriate decisions to minimize the negative impacts.

A financial analysis is also provided which analyses the most suitable mechanisms for financing the costs of the FAB, which are however negligible with respect to the benefits achievable in terms of flight efficiency and productivity.

The potential risks that exist for the smooth and timely establishment of the FAB in several areas are analyzed and the appropriate measures to minimize the probability of occurrence or to mitigate the impact are proposed. In most of the cases a number of effective measures and actions have already been undertaken for this purpose by the ANSPs.

This report complements the Cost Benefit Analysis with a qualitative and more general assessment of the economic and financial impact of the DANUBE FAB establishment on the main stakeholders. The results confirm the ones obtained in the CBA, showing a high added value from the establishment of the DANUBE FAB in several areas and for all stakeholders.

2 Context

2.1 Aims, Objectives and Requirements

The Single European Sky (SES) program undertaken by the European Commission represents a legislative approach aimed at meeting future capacity and safety needs on a broad European level rather than locally. The objective of such program is the restructuring of the European airspace as a function of air traffic flows, creating additional capacity and increasing the overall efficiency.

The European Parliament and the Council requires that by December 2012, Member States shall take all necessary measures in order to ensure the implementation of Functional Airspace Blocks with a view to achieving the required capacity and efficiency of the air traffic management network within the Single European Sky. Functional Airspace Blocks are volumes of airspace based on operational requirements and established regardless of State boundaries, where the provision of air navigation services and related functions are performance-driven and optimized with a view to introducing —in each functional airspace block— enhanced cooperation among air navigation service providers or, where appropriate, an integrated provider.

The DANUBE FAB is aimed to ensure compliance with the EU Single European Sky legislation. In 2003, to enhance cooperation in the ATM/ANS, a Memorandum of Understanding for the establishment of ATM Cooperation in South Eastern Europe was signed by the Directors General of Civil Aviation Authorities of Bulgaria, Moldova, Romania and Turkey. Under This MoU an "Initiative for creating the prerequisites for the establishment of a functional airspace block" was signed by the Directors General of BULATSA and ROMATSA in 2004.

The development of the DANUBE FAB Project is divided into following phases:

Phase nº	Title	Status
1	Feasibility Study Phase	Completed
2	Preliminary Design Phase (2009-2010)	Completed
3	Detailed Design and Pre-implementation Phase (2011-2012)	Ongoing
4	Implementation Phase (2012+)	Not started

Table 1: DANUBE FAB Project Phases

The DANUBE FAB Project has received the financial support of the EU within the TEN-T framework. EUROCONTROL is actively participating with support to the project for the preliminary Design and the Detailed Design and Pre-implementation Phases.

The objective of the present Business Case, developed within Phase 3 of the DANUBE FAB project, is to evaluate the business impacts of the operationally feasible DANUBE FAB concept. Values, alternatives and options which are still retained as feasible for implementation after previous R&D Phases, are assessed. Stakeholder divergence of interests and risks/uncertainty are identified and proposals for mitigation actions are formalized. An acceptable level uncertainty is achieved so that a decision with calculated risk can be taken by relevant stakeholders.

The Republic of Bulgaria and Romania need in fact to ensure that the reorganization of their own ANS provision takes place in an efficient way from an economical point of view, bringing benefits to both the service providers and to their customers – (i.e. the Airspace Users) and with favourable impact on all stakeholders and on the countries in general. Given the current situation and the future challenges that the Air transportation sector faces, it is of key importance that the investment on a FAB is fully consistent with the evolution of the economic environment and that the investment strategy is coordinated with the expected revenue rates.

Additionally according to Regulation (EC) 176/2011 by 24 June 2012 Member States shall provide information related to the establishment of new functional airspace blocks, including supporting documentation demonstrating the overall added value based on cost-benefit analyses. The Business Case, together with the Cost Benefit Analysis developed in parallel, provides the necessary elements for the justification of the overall added value from the establishment of the DANUBE FAB, including the optimal use of technical and human resources.

2.2 Functional Performance & Metrics

As all European States and Organisations have endorsed the ICAO Global Air Traffic Management Operational Concept, and as that document forms the overarching operational concept for SESAR, the relevant Key Performance Areas in the framework of the DANUBE FAB establishment are considered accordingly as follows:

KPA	Description	KPI	EC KPI for FAB target setting (EC Reg. 691/2010)	EU-wide performance target for RP1
Safety	Safety is the highest priority in aviation, and ATM plays an important part in ensuring overall aviation safety.	Accident probability per operation (flight) absolute number of ATM induced accidents absolute number of ATM induced serious or risk bearing incidents	Effectiveness of safety management as measured by a methodology based on the ATM Safety Maturity Survey Framework Application of the severity classification of the Risk Analysis Tool Reporting of just culture	
Capacity	The inherent capacity to meet airspace user demand at peak times and locations while minimizing restrictions on traffic flow	Number of IFR flights able to enter the airspace volume in a time period (1 hour/1 year)	RP1: Minutes of en route ATFM delay per flight RP2: addressing airport-related capacity issues	0.5 minute en-route ATFM delay per flight for the whole year 2014
Cost Effectiveness	The cost of ATM service to airspace users. It covers 2 areas: • Direct Cost of Gate-to-Gate ATM • Indirect Costs (attributable to non-optimal gate-to-gate ATM performance)	Total annual en route and terminal ANS cost in €/flight	RP1: National/FAB determined unit rate for en route air navigation services RP2: National/FAB determined unit rate(s) for terminal air navigation services.	unit rates €57.88 in 2012, €55.87 in 2013 €53.92 in 2014
Environ-mental sustainability	The contribution of the ATM system to the protection of the environment by considering noise, gaseous emissions, and other environmental issues during the implementation and operation of the ATM system.	Average fuel consumption per flight as a result of ATM improvements Average CO2 emission per flight as a result of ATM improvements	RP2: development of a FAB improvement process on route design including the effective use of the civil/military airspace structures (e.g. CDRs)	-0.75% of the route extension in 2014 compared with 2009
Efficiency	Efficiency addresses the operational and economic cost-effectiveness of gate-to-gate flight operations from a single flight perspective.	Horizontal en-route efficiency (excess distance flown per flight) Average block to block time extension of the flights with time longer than planned	No specific KPI defined	-
Flexibility	Flexibility addresses the ability of all airspace users to modify the requirements they place on the ATM System in a dynamic manner	Number of scheduled flights with departure time as requested (after change request) Percentage of route/vertical change requests	No specific KPI defined	-

KPA	Description	KPI	EC KPI for FAB target setting (EC Reg. 691/2010)	EU-wide performance target for RP1
		accommodated		
Predictability	Predictability refers to the ability of the airspace users and ATM service providers to provide consistent and dependable levels of performance.	Number of flights arriving on time (as planned) Average arrival delay of the flights with delayed arrival	No specific KPI defined	-
Security	Safety is the highest priority in aviation, and ATM plays an important part in ensuring overall aviation safety.		No specific KPI defined	-
Interopera-bility	The compliance of the ATM System with global standards and uniform principles to ensure technical and operational interoperability with Global ATM Systems and to facilitate homogeneous and non-discriminatory global and regional traffic flows.	Performance Enablers: if performance in these areas is unsatisfactory, performance in other KPA Groups will suffer. Unsatisfactory performance here may even act as a major inhibitor	No specific KPI defined	-
Access and Equity	The capability to ensure that all airspace users have the right of access to ATM resources needed to meet their specific operational requirements and to ensure that the shared use of the airspace for different airspace users can be achieved safely.		No specific KPI defined	-
Participation	The grade of involvement of ATM community in the planning, implementation, and operation of the ATM system.		No specific KPI defined	-

Table 2: Applicable KPAs and relative KPIs

2.3 Baseline and Options Considered

2.3.1 Baseline Scenario

It represents the situation as if nothing is done for the DANUBE FAB implementation, i.e. the Business as usual option. Each ANSP continues to plan and operate the delivery of Air Traffic Services independently on the other, the route and sector design take place at a national rather than at a FAB level.

All the other initiatives currently ongoing or that will be implemented in the future are nevertheless taken into account: SESAR, ESSIP and all other initiatives not directly dependent on the FAB.

This scenario is used as a baseline to calculate all the additional costs and savings achieved in the other scenarios.

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2.3.2 FAB Scenario

The FAB scenario is created as a modification of the baseline, taking into account the FAB related impacts (i.e. delta scenario). The main option considered is represented by the partial integration model, as retained for DANUBE FAB out of Phase 2. This is characterized by the existence of the two services providers ROMATSA and BULATSA, providing Air Traffic Services to Airspace Users from virtually connected ATC centers in both States. Harmonization and cooperation will be achieved in several areas, including planning, co-ordination, development of policies, procedures and external relations, with the aim of achieving optimum capacity, flight efficiency and cost efficiency while maintaining a high level of safety.

The partial integration concept is considered the best options amongst all the available ones (i.e. creation of joint organizations for specific functions). It is in fact very wide in scope and allows enough options to be implemented in terms of common activities and harmonized functions. At the same time it guarantees the financial and legal independence of BULATSA and ROMATSA, which is in line with the State Agreement.

The change with respect to the current organization structures will be minimal for both ANSPs, since it will imply the creation of an additional structure on the top of the current ones, which will reflect closely the governance structure created prior to implementation. A part from an additional cost for both ANSPs in terms of human resources dedicated to FAB management matters, no specific structural change will be necessary. The impact on administrative matters will also be minimal, since the two existing administrative functions one for each ANSP will be maintained and only some additional activity will be required from time to time to manage common procurement or secondment of staff depending on the needs identified.

The DANUBE FAB Governing Council will be established to provide oversight and approval of key FAB documentation (annual plans, safety policy, airspace policy, performance plans etc). The NSA Board, composed of the heads of NSAs of both States will oversee the NSA supervisory activities, while the ANSP Board, composed of the representatives of both ANSPs will be in charge of ensuring effective cooperation in safety policy, operational concept, technical development and administrative matters. In order to fulfill their tasks, the bodies may set up specialized Standing Committees or other supporting bodies, in accordance with their respective Rules of Procedure.

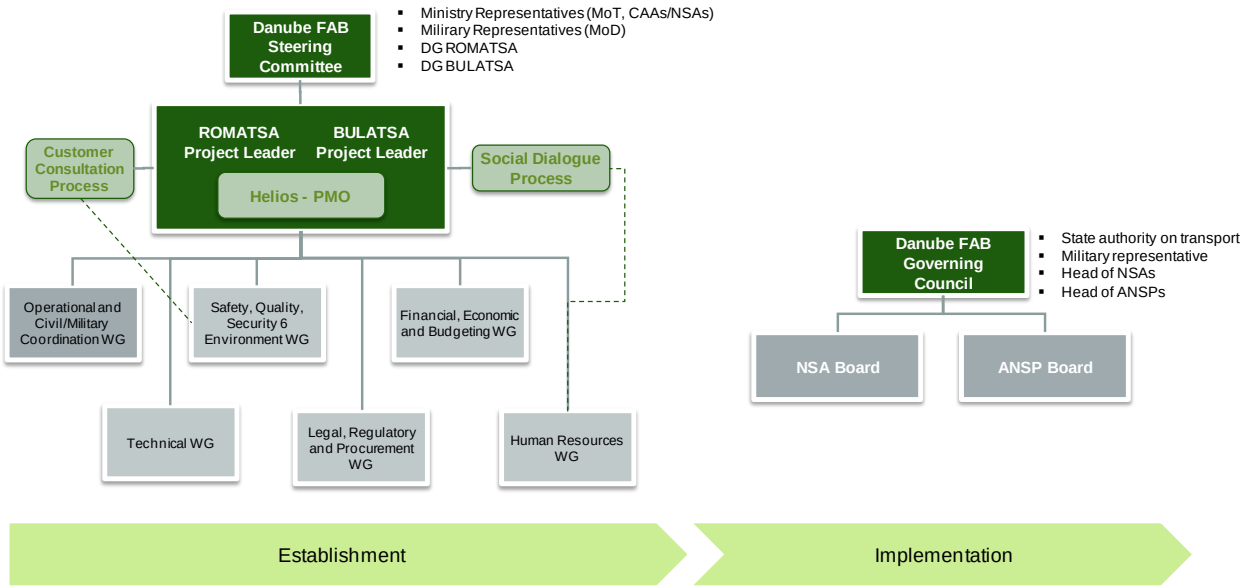

Figure 1: DANUBE FAB Governance Structures

Besides governing and managing all the DANUBE FAB internal activities, the Governing Council together with the ANSP and NSA boards will implement plans and actions for external relations. This is foreseen to include common participation in international meetings, requiring a previous coordination of views in order to have consolidated positions to be presented within the international/European context. This may include consultations with stakeholders and staff on planned changes, user charges, performance plans, etc, or participation to various fora based on FAB level representation, such as the Network Management Board.

3 Analysis of Impact

3.1 Functional description

3.1.1 Regulatory framework in a FAB

A common or harmonised regulatory regime in a FAB should be highly beneficial to the safety, stability/ continuity and coherence of operations, i.e. beneficial to all FAB stakeholders and the other interested parties.

ICAO (see Ref. [12] and [13]) has stated that the establishment of FABs is considered in line with ICAO Assembly resolution A36-13 inter-alia since this supports the ICAO stated objective of improving safety by reducing the potential for errors that can arise because of the application of different rules in adjacent airspaces.

The DANUBE FAB State Agreement [8] provides the legal basis by which the FAB can formally be established, providing the details on the governance structure composed by a DANUBE FAB governing Council with functions of oversight and approval, plus the NSA and ANSP boards. All the regulatory constraints to the full realization of FAB implementation have been already tackled and resolved by the Agreement.

During the current establishment phase, the National Supervisory Authorities Coordination Committee (NSACC) is in charge of the preparation of the legal and institutional framework necessary for the establishment of the FAB in relation to the supervision processes and for the harmonization of regulatory baselines applicable at national levels in ANS domain. The NSACC is composed by representatives from the Bulgarian and Romanian NSAs involved with the appropriate expertise relevant to the regulatory and supervision functions to be performed in respect to preparation for establishment and further implementation of the FAB. The NSACC is responsible.

Currently lower and upper ATS route network has two different divisions: FL245 within Bulgaria and FL 285 within Romania and there are still differences in the alignments of lower and upper ATS routes. These factors will be harmonized before the implementation of the FAB operations, in order to ensure the smooth transition to seamless flight operations within the whole DANUBE FAB Airspace.

3.1.2 Safety Oversight and Supervision

The National Supervisory Authorities of Romania and Bulgaria are committed to cooperate on ATM/ANS supervision issues and on the harmonization of applicable rules and procedures in the context of DANUBE FAB [8]. This cooperation will be formalized through a specific NSA Cooperation Agreement, which is currently under preparation under legal and governance DANUBE FAB activities.

This will impact the arrangements for supervision at national levels, which should be reviewed and, where necessary, aligned with the responsibilities and arrangements in the State agreement ([8]). The most relevant change would be the supervision of services provided in cross-border airspace, requiring advanced cooperation for sharing responsibilities and data, as specified in the State Agreement.

A single joint FAB Supervisory Authority is not planned, in line with all the other FAB initiatives.

The main impact then remains the establishment of a solid cooperation framework, implying more consistent and harmonised supervision in the FAB, which should be positive in principle. This in fact could improve the effectiveness and efficiency of supervision in a FAB vs. the pre-FAB situation, through a set of legal provisions and arrangements for harmonisation of their oversight activities, agreement on the application of common oversight activities and pooling of expert resources.

This will certainly imply an inevitable negative impact resulting from additional effort and resources required to ensure that a proper harmonization of activities related with regulatory and supervision functions takes place. This will mainly formalize through the DANUBE FAB NSA Board activities, which will be aimed at assessing and endorsing DANUBE FAB safety policy and safety case, monitoring the processes for certification, oversight, safety assessment, and safety management system convergence, preparing the annual plans and reports and providing the formal interface between the two NSAs involved. Additional activity will be required to guarantee a uniform approach to the interpretation and application of international requirements and to ensure a harmonized handling of cases involving non-compliance. These tasks will represent new forms of cooperation, collaboration and coordination processes plus administrative procedures at NSA and FAB governance levels.

On the other hand it must be highlighted that ineffective or inefficient supervision may seriously affect and prejudice FAB operations and the various stakeholders, including safety and the public. Legal discrepancies in the administrative procedures, confidentiality issues, laws on civil servants, cultural differences etc. may become obstacles for the effective implementation of the agreement and need to be levelled in order to allow establishing effective and efficient supervision in the DANUBE FAB. The impact on performance aspects will certainly increase with the implementation of the SES performance scheme and the new role of NSAs in that regard.

Different business models implemented within the DANUBE FAB will require different supervision models, main issues to be considered are:

- Ensure close coordination between ANSPs and National Supervisory Authorities;
- Definition of each Sate's National Supervisory Authority roles:
  - Certification of ANSPs;
  - Supervision of State ANSP;
  - Cross border services case: certification and supervision of foreign ANSPs, this may be done following supervision common procedures;
- Implementation of FAB supervision common plans and harmonised practices:
  - National supervisory authorities closely cooperate on the supervision of the air navigation service providers within the airspace concerned and that their practices are harmonized;
  - Safety Management: inclusion of the NSAs in the process to the appropriate degree to facilitate the approvals process; joint and simultaneous approaches, e.g. to certification; and a published, explicit basis of the safety regime on just culture;
- FAB Supervisory structure, different options are available from low to high levels of NSA relation:
  - Separated NSAs establishing cooperative plans and coordinated Safety Management Systems;
  - Inter-NSAs agreements instrumented under a Supervisory committee and an integrated Safety Managements System.

Legal considerations need to be taken into account when selecting the FAB supervision model. The States will mutually recognize the supervisory tasks of their national supervisory authorities and the expected results of these tasks. Additionally, the States will undertake the responsibility to ensure that their NSAs closely cooperate on the supervision of the ANSPs and conclude the appropriate cooperation agreements.

Additionally, clarification on European authorities (EASA) role and relations with FAB supervisory authorities will be further assessed when defining the FAB implementation strategy.

Concluding the mandatory NSA Cooperation Agreement on supervision can only provide for a better legal framework for supervision; this needs to be further cascaded into NSA agreements that make extensive use of the legal options (such as division of responsibilities between the NSAs) and provide for concrete local solutions to overcome the various shortcomings.

3.1.3 MET/AIS provision

Both BULATSA and ROMATSA have MET included in their administrative ANS structure , a situation which, despite of the fact that only few States in Europe adopted so far, presents several advantages in terms of quality of the service provision, including a prompt response for improving the services to any new requirements. Full compliance with ICAO Annex 3 is currently guaranteed by both ROMATSA and BULATSA, which have achieved a high level of standardization of the current MET services.

Regarding AIS, only briefing functions are ANSP responsibilities, the others being under NSA responsibility in Romania. A transfer of this AIS provision from the Romanian CAA to ROMATSA is underway. The opportunities for cooperation will be expanded once the AIS provision is fully transferred to ROMATSA and will mainly consist in the harmonization of products, procedures and working methods that will enable delivering a higher quality of service to Airspace Users.

There is no compelling argument or interest to change the current organization of MET/AIS provision, at least in the short term, hence the financial, operational and safety impact of FAB in this area will be minimal. Even in the longer term the option for a joint designation of an integrated MET service provider is very unrealistic, due to the very strategic role of MET within the National frameworks of ATS provision and the uncertain benefits achievable.

The creation of DANUBE FAB would rather allow the sharing of best practices between ROMATSA and BULATSA, possibly enhancing the quality of service provision from both sides and creating increased confidence of the users in the services provided by the two organisations.

Each state is responsible for originating data, but a common data format adoption (e.g. XML) for METAR and other MET products would enhance harmonization. Software harmonization also is a field for common procurement and maintenance: the ROMAVOS software for example has been already developed, thus avoidance of duplication costs would be possible.

New level of contingency and minimum service level concept could be enabled by the common support network AFIS/AFTN with backup options in case of local failures. For instance self briefing facilities failures could be backed-up by the partner through authorized data.

The harmonization of the services in the two Countries could enhance interoperability & the level of performances and would ensure a solid base for the coherency of the future actions required by the evolution of Danube FAB. Some limited opportunities for cost savings could be represented by joint organization of training events in the context of high level formation of MET staff.

3.1.4 Management of human resources, social factors and related changes

The availability of staff having adequate competence/qualifications and in sufficient number is of prime importance for the safety, continuity and sustainability of service provision in a FAB, while consideration must also be given to cost-efficiency.

A lack or failure to timely address social factors and to resolve human resources and staffing issues may have detrimental and lasting effects on FAB operations and performances leading to resistance, subsequent delays, re-working of solutions and additional costs. On the contrary early initiation of social dialogue may support timely agreement of effective solutions to the social issues.

This is why establishing harmonized human resources management policies and maintaining social dialogue activities in a FAB should result in positive impact in many ways, even if it will consume considerable time and effort. Facilities for meetings, releasing social partner representing staff from duties and making available the necessary time for the management bear non-negligible costs. Social dialogue however should be considered and managed as an enabling activity and process in support to other project work packages. The effectiveness of social dialogue will determine the progresses and success of the FAB, according to the ability of the States to establish effective arrangements between them and with all social partners.

Within the DANUBE FAB context a change management programme has been initiated to implement all the required steps in order to gradually prepare employees to the change implied by the implementation of FAB on their working routines.

A social Consultation Forum has been set-up as permanent body with the main objectives to encourage and develop the social dialogue within the framework of DANUBE FAB, to increase the mutual understanding between the Social Partners and their respective national member organizations and to deliver opinions to the Steering Committee on initiatives in particular with regard to social and employment issues. Three DANUBE FAB Social Consultation Forum meetings have already been organised and other two are envisaged by the end of 2012, in order to obtain feedback from stakeholders and promote publicity and project awareness, with the participation of representatives from both ANSPs and representatives of all trade union and professional organizations in ROMATSA and BULATSA.

However the application of a joint Human Resource Policy at DANUBE FAB level is not considered feasible in the short term, considered that:

- the partial integration concept was chosen for DANUBE FAB, maintaining the two existing services providers, i.e. ROMATSA and BULATSA;
- the social policy is under the competence of the EU Member States and, from this point of view, the two organizations operate under different legal systems;
- collective agreements are signed with trade unions and many aspects of human resources policy are covered by these collective agreements and by the Internal Regulations in effect.

Therefore the harmonization of the national HR policies will be guaranteed by the application of high level HR Policy principles commonly agreed at FAB level to the specific local policies, according to the applicable legislative and contractual constraints. This will allow achieving a certain level of harmonization within

DANUBE FAB regarding centrality of HR within each organization, the opportunities, treatment and transparency offered to employees by each partner organization.

It is considered that the new international dimension implied by the FAB could have a positive impact on the image of the two ANSPs and their staff. Also human exchanges between employees from the two partner ANSPs can enhance personal skills and generate new expectations.

Labour costs remain at National level, but secondment is specifically foreseen by the art. 34 State Agreement ([8]). This will enhance the opportunities for mobility and working together to specific activities and projects of common interest.

In the longer term, depending also on further EU labour legislation developments and achievements in other areas of cooperation between the two ANSPs, a harmonised concept and collaborative framework for the management of human resources might become accepted by all social partners in all FAB States, permitting human resources optimization within the whole DANUBE FAB context.

3.1.5 Common Procurement

Common/joint procurement is not widespread across the ATM industry. However a common process is considered promising in terms of reducing costs and investments.

The report “Cost of Fragmentation in European ATM/CNS” ([4]), imputes to piecemeal procurement mainly of ATM system an additional system cost in Europe of €30M-€70M.

There are few examples of joint activities delivering benefits in ATM market:

- The iTEC initiative by ANSP in the UK, Germany, and Spain in cooperation with Indra, to develop the FDP solution according to the same common standards based on the SACTA system;
- The CoFlight initiative, by the French, Italian and Swiss ANSPs together with Thales and Selex;
- The COOPANS partnership between Denmark, Ireland, Sweden, Austria and Croatia together with Thales which capitalises on the shared experience of EUROCAT users in order to harmonise software upgrades.

Within the framework of Danube FAB, common procurement is an area for cooperation permitted and encouraged by the “International Agreement”. Since 2008 common procurement of services has been performed for 4 different contracts, mostly related to consulting services for the creation of the FAB.

It is foreseen that non-negligible cost savings could be introduced by common procurement of technical systems and their related maintenance. This requires a previous realization of the common CNS strategy, in order for both ANSPs to jointly formalize an inventory of systems and services, identify potential candidates for joint procurement initiatives and develop a harmonised strategy defining a common time line for implementation of the systems. Due to the complexity of these tasks there is currently no formal agreement on the scope of the achievable benefits, but coordination is ongoing to clarify the potentials and support decisions in the future.

3.1.6 Military operations

The SES legislation and regulatory framework is applicable only to General Air Traffic (GAT) and does not cover military operations and training. National military ANSPs are not subject to certification if they are not primarily offering their services to GAT, as is the case in both Bulgaria and Romania. However when one considers SES legislation in the context of the whole ATM environment, significant benefits could accrue if military authorities also implement the relevant parts of this legislation. This is explained in the EUROCONTROL Guidelines for the implementation of SES legislation by the Military ([14]).

- ATM could become safer through greater commonality both within Europe and in military operations outside Europe; enhanced interoperability could lead to better utilisation of existing infrastructure and potentially of joint operations, and financial assistance may be made available to military authorities to ease the burden of implementation [14]
- significant political and economic benefits could be achieved through enhancing civil-military coordination and cooperation based on transparency, trust, political credibility and recognition of the capability of military ANSPs to provide safe, efficient and cost-effective services to GAT, for example at military aerodromes

- demonstrable and quantifiable equivalence with civil counterparts, a stronger position in law and enhanced public perception.
- Greater civil-military harmonisation will make a positive contribution to safety and utilising joint infrastructure could potentially reduce costs.
- potential for recovery of funds and financial assistance from civil stakeholders.
- Greater military-military harmonisation and interoperability between Member States (including on operations) could also produce benefits in terms of enabling cross-border operations and facilitation of the establishment of the FABs.

Potential risks that have been identified if military authorities implement SES include the impact on military preparedness for operations, concern over additional costs and a perceived loss of influence or 'control'. However as long as the military safeguard clause is retained and enforced as appropriate, the principle should not cause disquiet amongst military stakeholders.

Article 1 of the Framework Regulation (EC No 549/2004) explicitly states that it is without prejudice to Member States' sovereignty over their airspace and their requirements relating to public order, public security and defence matters.

If military authorities do not implement SES, risks identified include the legal implications in cases in which military services would be implicated in air accidents, particularly if GAT is involved. It will also prove increasingly difficult to continue to provide exemptions for military authorities on safety and capacity grounds and to maintain equivalence in training regimes.

The Chapter 8 of the DANUBE FAB State agreement [8] should be used by Member States as the prime legal and institutional framework within which establishing or facilitating enhanced civil/military and, to the extent this is deemed useful or necessary, military/ military cooperation and coordination.

Upon the basis laid down by the FAB agreement, general DANUBE FAB architecture requirements [7] establish that:

- Area control services provided by ACC Bucharest and ACC Sofia, including civil-military coordination function
- Military authorities of the States shall be kept responsible for the oversight of military provision of air navigation services
- Civil/military collaboration for joint cooperation in order to maximize the utilization of airspace
- When feasible temporary segregated areas across national borders may be established with respect to national sovereignty rights, in areas not constraining the main civil traffic flows
- Harmonization of Civil/Military coordination procedures
- Segregated/Reserved airspace activity should be taken into account when determining sector capacity

A joint civil-military coordination process will ensure consistency between the planning and utilisation of airspace and route networks in relation to the planning and use of airspace required for military activities [9]. The DANUBE FAB High-Level Airspace Policy Body will be responsible for Flexible Use of Airspace application within the cross-border airspace at the Strategic Phase, in order to assess, define and coordinate the related activities needed to ensure safe and efficient execution of civil operations, while guaranteeing satisfaction of specific military operational requirements described in [9].

Within the DANUBE FAB area of application, the pre-tactical level will be handled by the current national Airspace Management Cells (AMCs), enriched with certain ATFM functions. A strong inter-coordination process will be implemented among the AMCs comprised within the DANUBE FAB area of application in order to better harmonise all users' requirements. Connectivity between AMCs should be deployed, providing both direct communication facilities and access to advanced planning tools, including, for a lead AMC involved in cross-border operations, the possibility of receiving airspace requests submitted by approved agencies from another state.

At the technical level SYSCO facilitates FUA level 3 operations and enhances situation awareness through the electronic exchange of flight data between civil and military Air Traffic Service Units (ATSUs) and military Air Defence Units (ADUs). The availability of this information will reduce the requirement for controller-to-controller verbal coordination. It should also improve safety, mainly for civil aviation, by ensuring that these flights are notified. The implementation of SYSCO is not however a cost imputable to FAB but rather to ESSIP objective (ITY-COTR) and SESAR Master Plan (AOM-0202).

These coordination activities will bring enhanced efficiency in the management and allocation of Airspace but on the other hand will imply a cost resulting from additional effort and resources required to propose and analyse potential changes to the shape, size and location of military areas and to establish new forms of cooperation, collaboration and coordination processes as implied by Chapter 8 of the State agreement [8]. Additional administrative procedures will also be required both at national and FAB governance levels. One representative from each authority responsible for military aviation in each Country will be part of the DANUBE FAB Governing Council, to provide oversight and approval of key FAB documentation. The Council will meet at least twice per year and will require previous preparation and analysis of the available documentation.

3.1.7 Terminal and airport operations

The DANUBE FAB area includes 6 TMAs (Burgas, Sofia, Varna, Bucharest, Constanta and Arad) and 22 CTR at all airports (except Brasov Cobrex heliport). The two busiest TMAs are Bucharest and Sofia, which are not causing any bottlenecks to the traffic flows.

Only 6,5% of flights departing/arriving to Bucharest-LROP are coming from the south using L619, L602 and L622 [5] which are the airways crossing the national border closest to the airport and their current design is already very direct, so only minimal enhancements would be possible in the horizontal flight efficiency.

Terminal ATS will be provided by ROMATSA and BULATSA respective ATSUs. Further evolution of terminal operations will be done in accordance with the European ATM Master Plan.

From a FAB perspective there is no expected change in the current procedures for air traffic service provision in terminal operations. The scope of changes foreseen in Airspace design and management is currently limited to the en-route part.

Some modification in the approach flight profiles could be envisaged, in case of modification of interfaces between lower and upper routes. This could bring some benefits in terms of noise impact in the areas surrounding airports, but there are no specific elements to assess this impact for the time being.

Since aircraft noise at an airport is often a political issue, dialogue with the airport operator, ANSP, local planning authority and local communities maybe required before any changes in operations in terminal areas, in the vicinity of aerodromes or on the aerodrome surface are implemented. This consultation process should be factored into project management time and effort planning of the assessment for FAB deployment where noise may be an issue.

3.1.8 Impact on General Aviation

The restructuring of Air Traffic Operations under the DANUBE FAB context is intended to primarily enhance the efficiency of the IFR traffic flows and only minimally affects VFR traffic. No significant impact is foreseen to the design of terminal airspaces and procedures, hence no particular restriction should apply to General Aviation approaching DANUBE FAB airports.

Equitable access to airspace will be guaranteed to all categories of users through a collaborative airspace planning process set up at strategic level between civil and military units. Aerial work aviation, regulated by Regulation (EC) No 730/2006, may require airspace reservation for specific operations, while recreation and sport aviation operating under VFR calls for more easy access to airspace.

Notwithstanding the fact that there is almost no requirement for en-route VFR flights above FL 195, these segment of flights will be accommodated in reserved airspace above FL 195 with specific arrangements agreed by the appropriate ATS authority.

No specific investment in ground or airborne equipment is demanded to operate in DANUBE FAB, thus limiting the impact on Airspace Users capital expenditure costs to zero. The DANUBE FAB will be capable of providing equal or better levels of service, improved safety, access and efficiency to Airspace Users without expensive avionics upgrades or training.

Very light Jets will configure as part of IFR civil airspace users, thus directly experiencing economic benefits stemming from optimized airspace and network design at DANUBE FAB level.

It can be concluded then that the costs for general aviation users to access and operate in the DANUBE FAB will be equal or less than it is today.

3.2 Performance impact

3.2.1 Safety

As part of the 'Partial Integration' concept for the DANUBE FAB, both States will remain responsible for the safety of their respective operations.

The overall safety levels of the DANUBE FAB States are expected to improve thanks to the exchange of best practices and lessons learnt in relation to the Safety Management Systems. This will be achieved through analysis of each other's processes, and in due course also through participation as observers in relevant processes of the partner State. Furthermore, through the combined knowledge of the safety experts, improved safety levels can be achieved in a very efficient way and the joint setting of safety targets will be made possible from RP2.

Specific common activities are foreseen in this area [6]:

- The preparation and maintenance of harmonised safety procedures & manuals for ANSPs, including Safety Policy: DANUBE FAB Safety Policy has already been formulated by ANSPs through their ANSPs Board, endorsed by NSAs Board and approved by DANUBE FAB Governing Council with due consideration to all relevant lines of responsibility and accountability for safety in DANUBE FAB
- Coordination of safety data collection, exchange and dissemination (monitoring and reporting): both ROMATSA and BULATSA are committed to jointly ensure improvement of safety occurrence reporting and enhancement of an open reporting/Just Culture environment, exchange of information concerning reported safety occurrences, safety data collection, internal investigation and analysis, harmonization of safety occurrences severity assessment, integration and dissemination of safety data at European level. This will ensure that the flow of appropriate safety information is improved and shared across the DANUBE FAB allowing the identification of key risk areas and the measurement of the effectiveness of safety improvement actions.
- Reduce or eliminate differences in SMS development and operational effectiveness, to avoid degradation in safety performance: the management of safety is a top priority at States, NSAs and ANSPs levels and this is reflected in existing and future arrangements. This is covered by NSAs arrangements for safety oversight /supervision and cooperation, ANSPs plans to harmonize their existing Safety Management Systems and States commitment to harmonize their relevant national rules and procedures for general air traffic and civil-military coordination within the DANUBE FAB
- Setting of safety targets, safety oversight and the accompanying enforcement measures: both States are committed to take the appropriate measures to ensure that DANUBE FAB will be established and managed safely, in accordance with the relevant legal and safety requirements. Setting of safety targets will be jointly ensured by both states while safety oversight will be carried out in a cooperative and coordinated way between NSAs of the Republic of BULGARIA and ROMANIA for DANUBE FAB
- Safety assessment, including hazard identification, risk assessment and mitigation, for operational changes resulting from the establishment or modification of DANUBE FAB: operational changes in relation to the establishment of DANUBE FAB will be introduced safely and evidenced by records showing the performed safety assessment. For the time being, airspace reorganization related to DANUBE FAB establishment is considered as a major change and steps towards its safe implementation are taken, including Real Time Simulation in Bretigny EUROCONTROL Experimental Centre and safety assessment. Processes related to risk assessment and mitigation for ANS system changes (operational, equipment, procedures and people) are sound and documented as per BULATSA and ROMATSA's Safety Management Manuals. DANUBE FAB Safety Case will make reference to the changes related to DANUBE FAB establishment and ANSPs and NSAs will cooperate for harmonization of activities in this safety area.

A common pool of safety experts from ROMATSA and BULATSA will be set-up to cooperate and work in the common activities listed above. This cooperation is expected to bring significant staff-cost savings thanks to sharing of efforts and avoidance of tasks' duplication, as analyzed in the related benefit initiative.

Common training activities have already been started enhancing the areas of safety awareness, safety culture and the skills of safety experts and bringing as added value a reduction of individual costs for this type of activity.

3.2.2 Capacity

The development of the airspace structure in Romania and Bulgaria over the past years has occurred in coordination and compatibly with the pan-European ECAC airspace. This process has developed an ATS route network and supporting ATC sectorization that has enabled an increase in capacity higher than the corresponding traffic growth, while maintaining safety standards.

Both the Sofia ACC (LBSR) under the control of BULATSA and Bucharest ACC (LRBB) under the control of ROMATSA are currently not experiencing specific capacity bottlenecks and are able to provide sufficient capacity to Airspace Users. This situation is not expected to substantially change in the forthcoming years if the traffic flows will not significantly change from the current ones, as indicated in the graphs in Figure 2 below, extracted from LSSIP data.

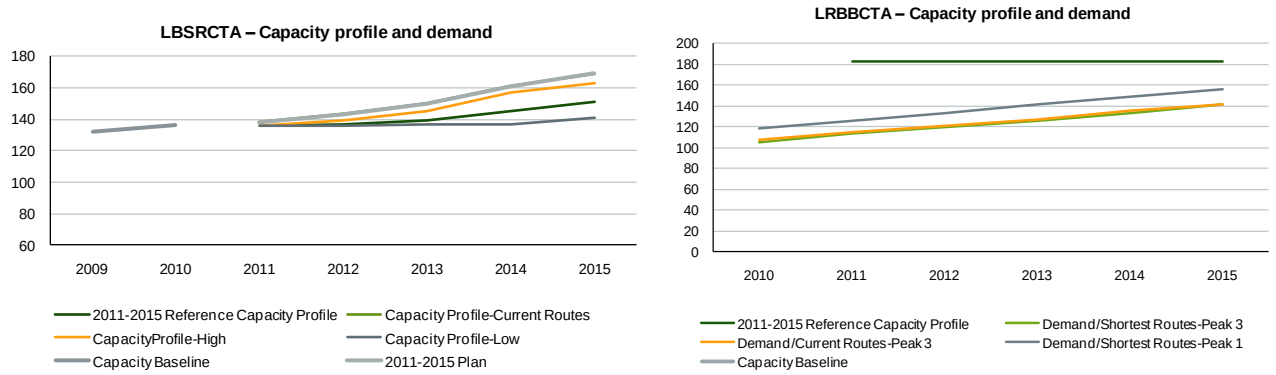

Figure 2: Capacity profiles and demand for Sofia ACC (LBSR) and Bucharest ACC (LRBB)

The relevant capacity targets for the short-term period are showed in the following table 3:

En-route ATFM delay min per flight BULATSA	2009A	2010A	2011	2012	2013	2014
EU wide capacity target				0,5	0,5	0,5
Reference value from the capacity planning process of EUROCONTROL				0,11	0,14	0,12
En-route ATFM delay prior to RP1	0	0	0			
National capacity target				0,11	0,13	0,11
En-route ATFM delay min per flight BULATSA	**2009A**	**2010A**	**2011**	**2012**	**2013**	**2014**
Reference value from the capacity planning process of EUROCONTROL				0	0	0
En-route ATFM delay prior to RP1	0	0	0			
National capacity target				0	0	0
En-route ATFM delay min per flight DANUBE FAB	**2009A**	**2010A**	**2011**	**2012**	**2013**	**2014**
DANUBE FAB capacity target				0,07	0,09	0,08

Table 3: Relevant capacity targets for RP1

The capacity target for Bulgaria at national level is more ambitious than the reference value provided by the capacity planning process of EUROCONTROL. This will be achieved thanks to the measures taken by BULATSA to ensure that capacity meet the expected traffic growth, among which the regional coordination for the development of route network and the improvement of procedures and separation minima to which the DANUBE FAB will contribute.

For ROMATSA on the other hand ATFM delays were zero for both en-route and terminal service provision recorded in the period 2009-2011 and there are no elements to foresee a change in the future. Therefore the capacity target adopted at national level is consistent with the reference value from the capacity planning process of EUROCONTROL and equals 0 minutes of ATFM delay per flight in all years.

Notwithstanding the absence of urgent need to increase airspace capacity, the common airspace design proposed for DANUBE FAB will deliver improved flight efficiency as primary impact but also increased capacity to a lesser degree. This fact will allow to increase the capacity margins to respond to the mid- long term needs and also to decrease the need for new ATCOs in response to the increase of traffic.

3.2.3 Cost Effectiveness

SES II provides for the replacement of the full cost recovery system by “determined costs” and risk sharing for route charges from 2012.

The EU-wide cost-efficiency target adopted by the EC for RP1 is a reduction of the average European Union-wide determined unit rate for en-route air navigation services and represents a decrease of -15% between the average EU-wide en-route unit cost in 2009 and the average EU-wide determined unit rate in 2014. This corresponds to an average decrease of -3.2% per year during the period.

According to the National Performance Plans for 2012-2014, both Romania and Bulgaria foresee a significant reduction of the real en-route determined unit rate, representing a more ambitious goal than the European average target. The average reduction per year in the period 2009-2014 is in fact -4,79% for Romania and -4,5% for Bulgaria and the absolute values in Euros are well below the European average for both, as showed in Figure 3 below.

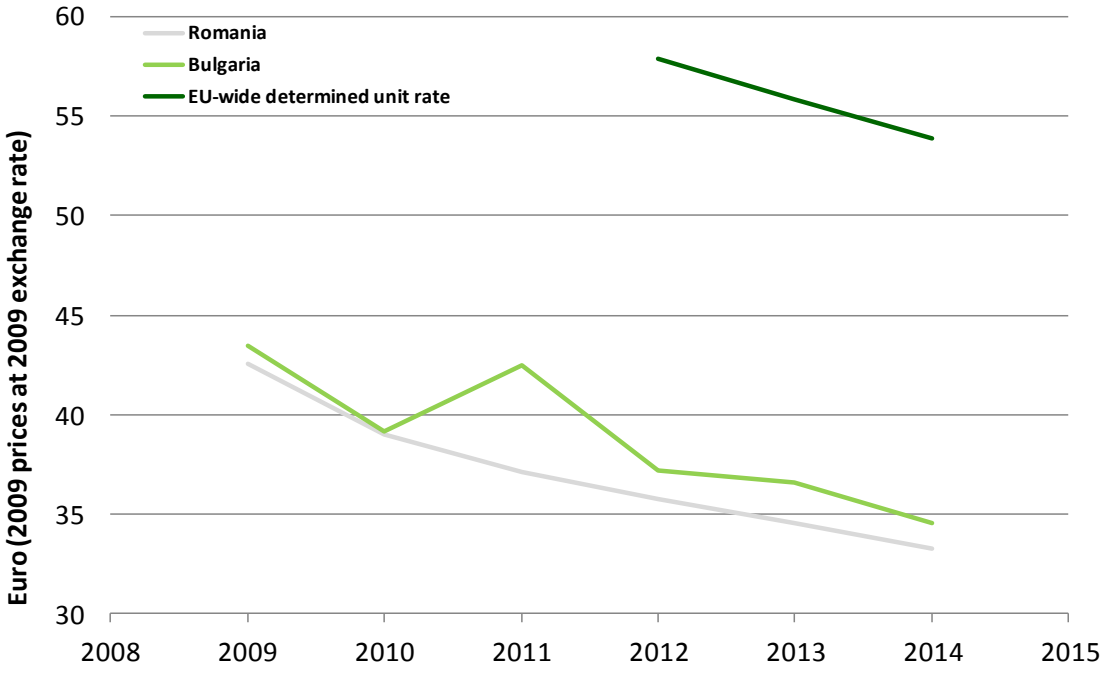

Figure 3: En-route determined unit rates

Due to the positive cash flow for ANSPs resulting from the Cost Benefit Analysis, a positive impact on the cost efficiency of both ANSPs is expected due to the introduction of the FAB. However a specific contribution of these benefits to the reduction of the national unit rates has not been included in the analysis due to the uncertainty around the baseline values and on the exact phasing of benefits.

Figure 4 below shows the average impact per flight of ANSP experienced benefits, obtained by dividing the yearly projected ANSP cash flows by the number of forecast IFR flights controlled. The resulting average saving per flight is 0,63€.

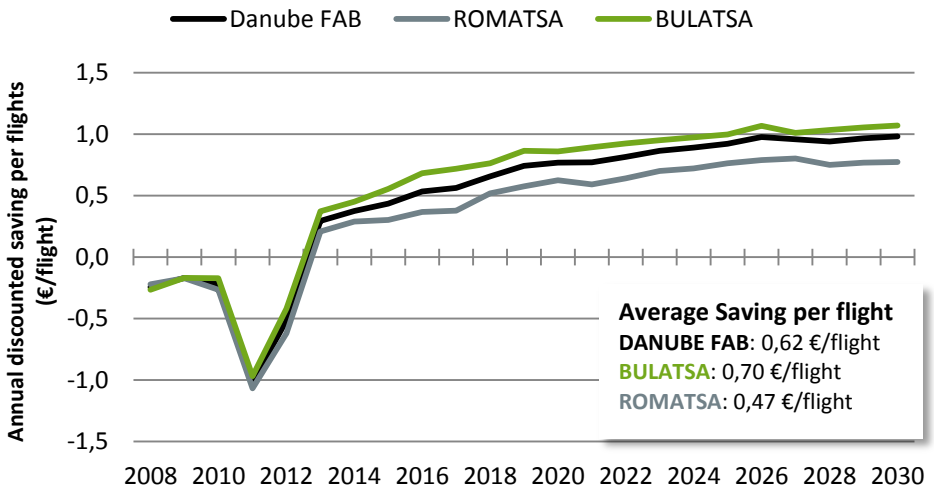

Figure 4: ANSP Savings per Flight

The constitution of a single unit rate for DANUBE FAB has been discarded as a short to mid-term option, due to the fact that it would bring more costs to prepare and set-up, than benefits for being implemented. This is in line with Airspace Users expectations as expressed in [16], according to which a single en route unit rate is seen as just one enabler for airspace design independent of national borders and it is not a goal in itself.

3.2.4 Environmental sustainability

The reduction of gaseous emissions is a major benefit induced by the reduction of flight distances and is tightly connected with the efficiency KPA.

For the first reference period, there is no mandatory national/FAB environment KPI, while for the second reference period, the national/FAB environment KPI shall be the development of a national/FAB improvement process on route design before the end of the reference period.

In line with these expectations, the implementation of an optimized route design at a FAB level is expected to bring significant benefits to the Airlines in terms of reduced fuel consumption and CO2 emissions, implying a direct impact on airlines operating costs.

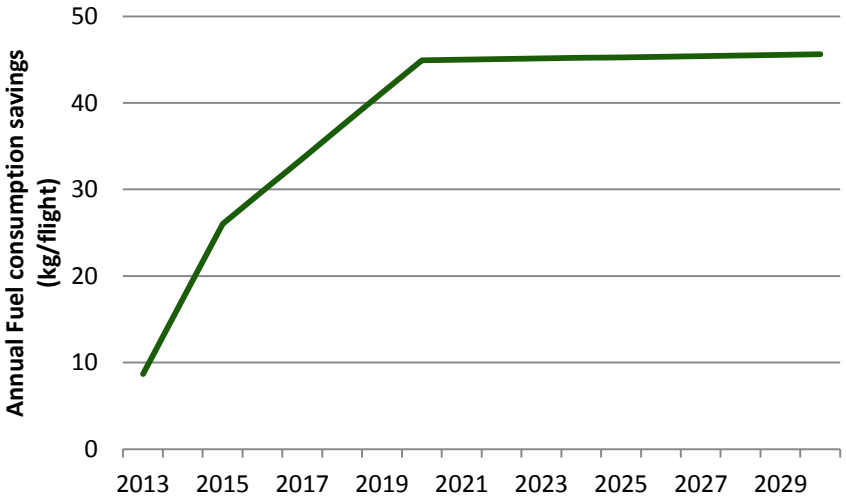

Figure 5: Average fuel consumption reduction per flight overflying DANUBE FAB as a result of ATM improvements

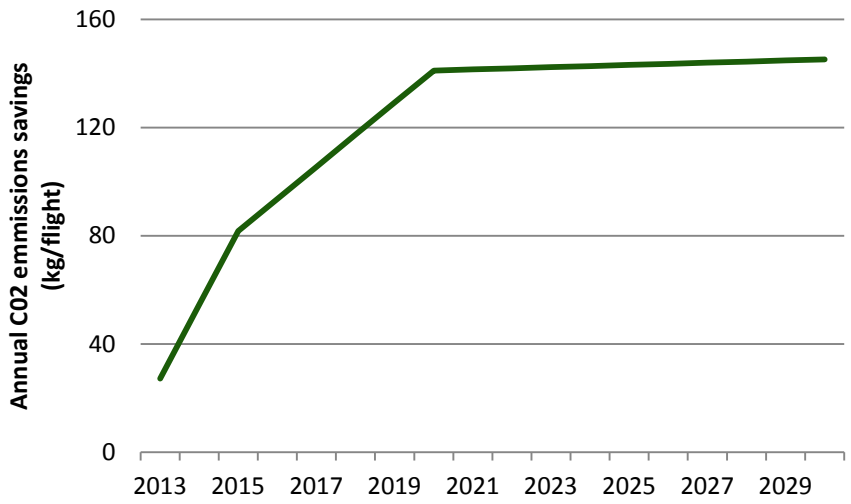

Figure 6: Average CO_2 emissions reduction per flight as a result of ATM improvements

¡Error! No se encuentra el origen de la referencia.7 and **¡Error! No se encuentra el origen de la referencia.**below present the cost reduction experienced by airlines, based on the forecasts for fuel prices and CO2 permits. The latter will be tradable on the specific ETS market.

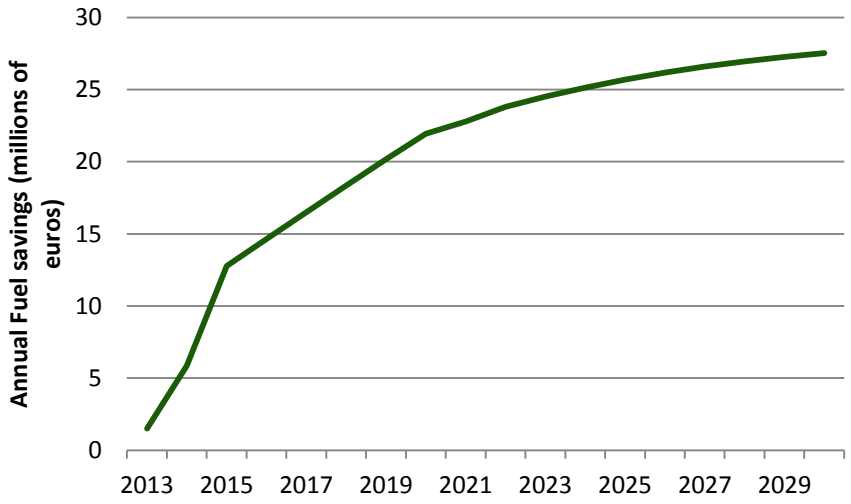

Figure 7: Fuel costs savings as a result of ATM improvements

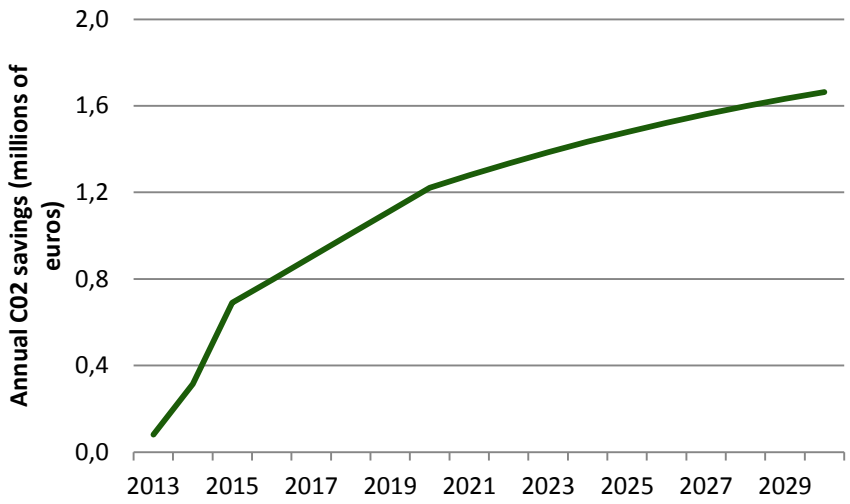

Figure 8: CO2 costs savings as a result of ATM improvements

Additionally the Implementation, certification and maintenance of an Environment Management System, in accordance with the requirements of ISO 14001:2004 standard, is currently in progress as part of the DANUBE FAB activities. This will help to identify and control the environmental aspects of the ANSPs activities, to improve national environmental performance continuously and to implement a systematic approach to setting environmental objectives and targets, to achieve these and to demonstrate that they have been achieved by the ANSPs.

3.2.5 Efficiency

Efficiency addresses the operational and economic cost-effectiveness of gate-to-gate flight operations from a single flight perspective and hence is closely related to environmental sustainability.

In addition to the benefits already treated within environment KPA, the reduction of the flight time implied by the optimised route network has also an impact in the direct operating costs experienced by DANUBE FAB Airspace Users.

Figure 9 below presents the direct operating cost reduction experienced by airlines, based exclusively on the time savings impacting costs such as crew, maintenance, depreciation, passengers compensation, rent and lease cost and without considering fuel.

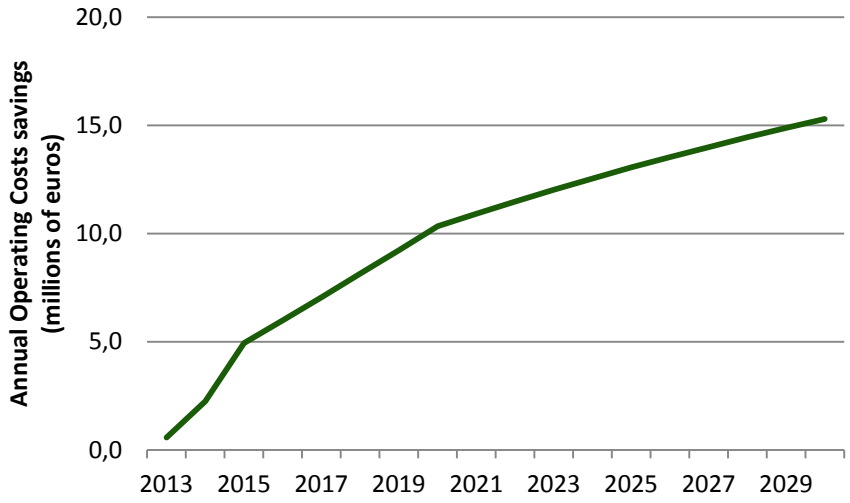

Figure 9: Operating Costs savings

3.2.6 Flexibility

Flexibility KPAs addresses the capability of the ATM system to accept changes of the requirements placed by Airspace Users in a dynamic manner. This can be measured through the percentage of flights departing at the requested time after a change to the original schedule or through the percentage of route/vertical change requests accommodated.

The DANUBE FAB is expected to provide high flexibility performances by minimizing the constraints on Airspace Users, both in terms of available capacity and of available routing options.

The harmonized application of FUA concept at FAB level will allow the ACCs/FMPs together with the Military ATS Units concerned to promptly react to any short-notice requirements, activating/deactivating or reallocating specific tactical CDR/RCA scenarios and, at the same time, establishing and activating the most appropriate airspace configurations.

As soon as dynamic airspace management based on enhanced FUA through a CDM process involving all the partners at tactical level (ACCs/FMPs, military ATSUs, AMCs and the NM) is implemented, the most suitable flight profile, together with short notice military requirements, will be accommodated through dynamic routes and airspace availability.

Connectivity between AMCs should be deployed, providing both direct communication facilities and access to advanced planning tools, including, for a lead AMC involved in cross-border operations, the possibility of receiving airspace requests submitted by approved agencies from another state.

Free Route Operations will represent the most advanced stage of flexibility in terms of facilitation of Airspace Users routing preferences within the FAB. Free Route Operations will be based on an evolution of the night DCT route network, unconstrained by national and FIR boundaries and capable of being reconfigured to meet demand.

3.2.7 Predictability

It is envisaged that greater predictability will result from the application of a layered planning process, gradually implemented in accordance with the trajectory-based operations concept. A gradual FAB-wide transition is planned in order to ensure that correct operational principles are followed as set out in the ICAO documentation.

To this aim the ATC environment will evolve and include support tools that will integrate the benefits of the layered planning process and trajectory-based operations (e.g. trajectory prediction, enhanced MTCD based on the trajectory environment, CPDLC, automated coordination and transfer).

This will allow decreasing the complexity of the environment, reducing conflicts and allowing less radical changes in aircraft trajectory to respond to conflict management needs, thus in turn enhancing predictability of operations.

3.2.8 Security

ATM security is concerned with those threats that are aimed at the ATM systems directly, such as attacks on ATM assets, or where ATM plays a key role in the prevention or response to threats aimed at other parts of the aviation system (or national or international assets of high value) and limiting their effects on the overall ATM network.

An overall positive impact of the DANUBE FAB establishment on security is expected, thanks to the implementation of an harmonized management system for Safety, Quality, Security and Environment, allowing the development of an harmonized approach and mutual arrangements with respect to the required security management systems of ANSPs.

In practice the sharing of best practices and the creation of a pool of security experts at FAB level will allow improving security levels and ensuring the fulfillment of the international and national requirements in the most efficient way.

3.2.9 Interoperability

Interoperability regulation (EC) No 552/2004 paved the way for the achievement of specific requirements on systems and procedures for the provision of interoperable CNS/ATM services by European ANSPs. This was amended by regulation (EC) No 1070/2009 to ensure to ensure that surveillance, communication and flight data processing systems are able to accommodate the progressive implementation of advanced, agreed and validated concepts of operation for all phases of flight, in particular as envisaged in the ATM Master Plan.

The existing interoperability requirements stemming from EC regulations are being timely implemented by both ANSPs. In addition to these basic requirements, the DANUBE FAB partners will plan improvements to include the automation of the coordination and transfer phases, the coordination of flights proceeding off ATS routes, the negotiated crossings of military training areas and to achieve the overall commonality of the technical ATM architecture.

The delivery of services within DANUBE FAB will be in fact based on the concept of virtual center, where the coordination between sectors and ACCs should be the same, providing seamless operations. Where lower sectors need to coordinate with approach or aerodrome control, the same principles will apply where possible. Building on the success of basic OLDI, all routine coordination, including tactical coordination, will be conducted using OLDI-SYSCO messages. SYSCO will be the first step to the improvement of interoperability, especially between ACCs. Continuous, unambiguous and code-conflict-free aircraft identification will be assured within the DANUBE FAB area of responsibility, primarily based on Elementary Mode S by 2015.

ROMATSA and BULATSA are assessing the feasibility of developing a common roadmap for procurement and implementation of new technical systems and constituents to ensure convergence and interoperability. This will lead to development, endorsement and realization of a plan aimed at achieving full interoperability at the end of the first reference period between the technical infrastructure of the Bulgarian and Romanian ATM Systems.

Besides bringing benefits to interoperability, the common roadmap for procurement and maintenance of ATM systems will imply positive impact on cost-effectiveness, due to the potential economies of scale stemming from common activities during system design and development.

3.2.10 Access and Equity

All airspace users will have the right of access to DANUBE FAB ATM resources needed to meet their specific operational requirements. No specific requirement on aircraft characteristics and equipment is due to the establishment of DANUBE FAB operations, thus implying a highly equitable treatment of different types of users.

The shared use of the airspace for different airspace users will be safely guaranteed through the coordinated application of airspace management process and dedicated tactical procedures.

3.2.11 Participation

The ATM community has been involved during the pre-implementation phase of DANUBE FAB, through a set of measures for the communication of results achieved at each step of the study (newsletter, website, conferences, etc.). During the development of the present studies the Airspace Users have been directly involved in the assessment through a dedicated Workshop organized in Bucharest in the April 2012. During the meeting the preliminary results from Cost Benefit Analysis and Business Case were presented and a constructive discussion was initiated, that finally led to an agreement on the methodologies and assumptions used in the studies.

3.3 Cost and Benefit Projections

The different initiatives to be undertaken under the umbrella of DANUBE FAB are expected to bring an overall positive economic impact on ANSPs and Airlines, as showed by the CBA results.

The benefits for Airlines will materialize in parallel with the initial date of FAB operations in 2013, since no upfront investment is required to comply with the DANUBE FAB concept of operation. For the two ANSPs on the other hand the break-even is expected to materialize in 2017 due to the pre-implementation and management costs required to implement the operational improvements, as explained in the CBA. However the overall positive impact on Airlines is expected to outweigh these costs since the beginning of FAB

operations in 2013 thus making the overall cash flow positive from this year on as depicted in Figure 10 for ANSPs and Figure 11 for Airlines.

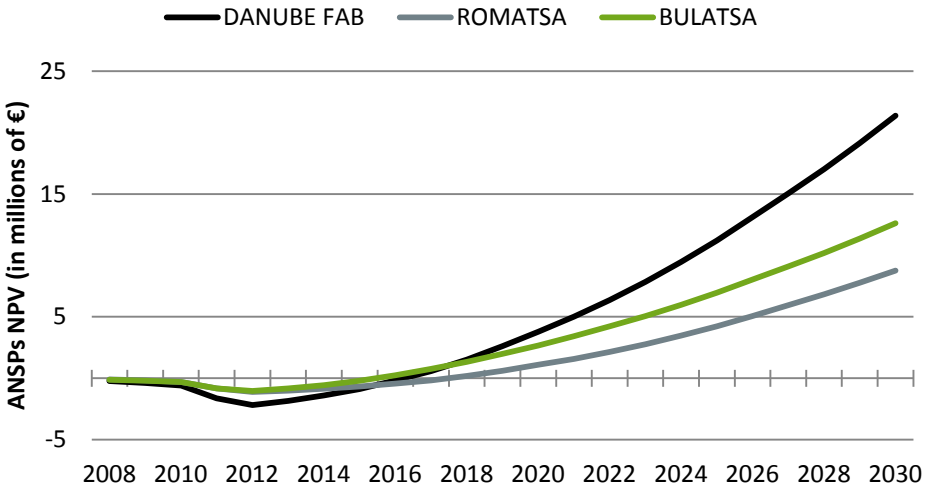

Figure 10: ANSPs Net Present value

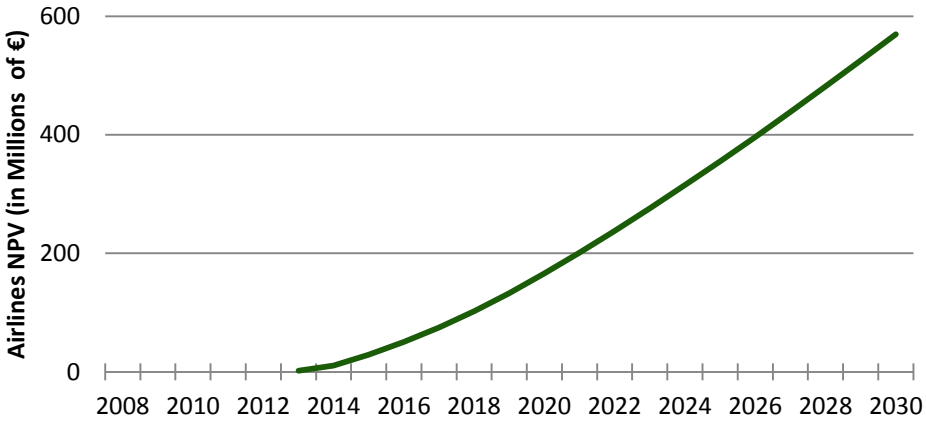

Figure 11: Airlines Net Present Value

3.4 Funding & Finance Issues

3.4.1 Coordinated Business Planning

Accurate and coordinated business planning will be of key importance to the future financial viability and success of the DANUBE FAB. Given the changes to the nature of cost recovery through user charges in accordance with EC Regulation N°1191/2010, aiming to move to ANSPs part of the risk related to cost overrun or revenue underperformance, it is essential that the new FAB partners commit to a robust business planning process. This should be coordinated via the Working Group for Finance and FAB charging.

Currently both organizations have their independent business plans and financial forecasts which form the reference baseline scenario without FAB establishment. These reference business cases already contain significant aspects that are related to the SESAR programme, some of which can potentially be re-allocated to FAB implementation on a joint basis. In addition to these ongoing SESAR initiatives a number of new actions and initiatives will be included in the coordinated business cases due to FAB implementation. These new actions and initiatives will generally follow one of the following criteria:

I. **Mandatory requirements for regulatory compliance**

II. **Optional or discretionary initiatives which involve potential benefits**

Mandatory requirements for regulatory compliance may not necessarily create benefits for the FAB partners and as such the business planning process will concentrate on ensuring value for money. The business case for each compliance action should identify the following aspects:

- The additional cost or investment required for implementation;
- The responsibility for investments / costs between FAB partners;
- Sources of funding (surplus, grants / subsidies, or loan financing);
- Mechanism to recover investment from users;
- Adjustment mechanisms to share revenues between FAB partners.

Optional or discretionary initiatives which involve potential benefits should undergo a rigorous business planning process that ensures that any discretionary investments generate an adequate return on investment that exceeds the FAB partner's cost of capital. Each initiative should be supported by an independent business case which follows a sequential approval process as the case is developed to increasing levels of detail. In some cases the benefits of different initiatives will be linked and this should be considered in the evaluation and approval process. For each discretionary business case the following aspects in addition to those required (above) for mandatory actions should be identified:

- The net benefits generated and the return on investment;
- The sharing of benefits between FAB partners, specifically in the case that cross-border provision of ATS is envisaged;
- The ability to finance the initiative and the agreement of users.

3.4.2 Funding of FAB project initiatives

Most of the FAB implementation benefits are either reductions in operating costs or future economies in capital expenditure programs. As such there is not a major requirement to finance additional investments; however there will be requirements to finance short-term working capital requirements due to timing differences between additional implementation costs and benefits.

The pre-implementation costs imputable to the preparation phase have been already partially financed at 50% though EC TEN-T funding complemented by 50% from National funding.

Among the FAB initiatives and benefits identified in this study, the "common airspace design, management and operational concept" is the initiative that brings most of the economic benefits to the ANSPs, mainly due to the increase of ATCO productivity and hence it does not imply any specific capital expenditure apart from the costs implied by the simulations and analysis of the operational changes. Other initiatives like the development

of a common CNS strategy and of a harmonized management system for Safety, Quality, Security and Environment and a common Procurement policy also bring benefits in terms of cost reduction and just require minor upfront investment to be realized.

The funding of many of the future possible initiatives may be shared between the FAB partners in accordance with the agreed business plans. The potential sources of funding include the following:

- Budgeted cost recovery through user charges;
- Existing cash reserves;
- Bank loans (potentially backed by government guarantees);
- Part-funding grants compliant with the SESAR framework;
- Development grants compliant with EC TEN-T or EC Cohesion.

3.4.3 Recovery of FAB implementation costs

The main mechanism to recover the FAB implementation costs for the ANSPs is through user charges. However, this does require the accurate budgeting of additional net costs and agreement with users. No loans are considered necessary to implement the FAB.

According to the timing in which the correspondent cash flow occurs in fact, this mechanism can be differentiated into three main methods:

- Recovery through user charges
- Adjustment mechanisms to share revenues between FAB partners
- Future benefits due to cost savings or additional revenues

In some cases it may be necessary to smooth the effect of short term implementation costs that are linked with future benefits, such that the short term impact on user charges is minimized. In these cases it may be necessary to finance the initial costs through surplus funds or government guaranteed bank loans, such that only the short term costs of financing the initial investment are passed onto users.

3.5 Risk Assessment, mitigation & indicators

The rest of this section analyses the main potential risks that exist for the smooth and timely development of the DANUBE FAB. The risks are classified according to the different areas affected and risk mitigation measures are proposed to minimize their potential impact.

3.5.1 Legal, institutional and organisational risk aspects

Romania and Bulgaria need to ensure that three types of agreements are concluded in order to proceed with the establishment of the FAB:

- The FAB States agreement on the establishment of the FAB. This has been already signed by authorities ([8])
- The FAB States agreement on supervision: pending
- The ANSPs cooperation agreement: pending

Due to the consolidated project's maturity phase and to the high level of acceptance of the DANUBE FAB by both States (Romania and Bulgaria institutions have being cooperating in the establishment of a FAB since 2003), the formalization of these agreements is not considered to be a risk in itself. It is entirely at stakeholders discretion if the agreements will exhaustively address the legal and institutional framework governing the activities of a FAB or whether they only set up a high level umbrella FAB framework, to be further complemented by lower level agreements/ acts.

The main risk related to the legal area is therefore to experience a delay in the approval of the pending agreements and related actions, causing a delay in FAB implementation.

In order to minimize this risk, the DANUBE FAB Steering Committee should monitor the timely implementation of the actions needed to launch the FAB, according to the agreed FAB implementation plan.

The Steering Committee should be supported the Project Management Office and by Working Groups, for the preparation of draft documents related to the FAB establishment.

The risk of late completion of one of the previous points, implied by the legal roadmap, could be minimized by the Steering Committee setting appropriate deadlines and by ensuring that all parties are aware of them. The committees should ensure that all the necessary resources in order to perform their activities without delays are made available. Whenever a specific deadline is not respected an alert of potential risk materializing should be activated and necessary corrective actions implemented.

3.5.2 Financial risk aspects

The Cost Benefit analysis has highlighted the high ratio between benefits and costs derived from the implementation of the DANUBE FAB between Romania and Bulgaria.

Costs for air navigation facilities and services incurred in a FAB are eligible for recovery from Airspace Users in accordance with the provisions set out in the SES implementing rules on a common charging scheme and consist with the provisions governing the EUROCONTROL Route Charges System and relevant ICAO policies. Pre-operational costs for the establishment of FABs have been financed up to 2012 by a shared TEN-T and national funding scheme.

Although the system financing ATS is based on full cost recovery, it also provides for the application of economic regulation. This implies that most of the benefits experienced by ANSPs represent a cost-reduction which is translated in the reduction of the Unit Rate charged to Airspace Users. According to this regime the costs implied by investments in ATM and CNS services are also included into the cost base of the ANSP for the calculation of the national Unit Rate.

According to EC Regulation N°1191/2010 ANSPs/States bear all cost risk derived from the difference between determined costs and actual costs, except for uncontrollable costs, where the difference with forecast shall be carried-over to the following Reference Period. NSAs shall ascertain that the additional costs were genuinely uncontrollable and shall give their agreement to the carry over. The careful definition and planning of the required investments, coherent with the FAB operational concept, become tasks of strategic importance then for the ANSPs, in order to ensure the smooth implementation of the FAB and to avoid financial losses.

The main alerting indicator would be a deviation of 10% over a calendar year of actual costs and traffic with respect to the values previously determined, in line with the alert threshold foreseen in Regulation 691/2010.

3.5.3 Human resource risk aspects

The contractual cooperation model, identified as the most suitable for implementing the FAB at least in the initial phase, does not imply any significant impact in terms of reduction in human resources. The FAB common functions will not imply any reduction of the current staff. Rather they will imply the avoidance of need for new staff to be employed by ROMATSA and BULATSA in the short/mid-term, thanks to synergies and collaboration in different areas.

On the other hand the engagement between ANSP management and representatives of all staff employed by both ANSPs is essential in order to guarantee the success of the FAB. The successful realization of the FAB will in fact depend on the cooperation between ANSPs at all levels and on the synchronization of operations on a day-to-day basis. An important indicator of malcontent among human resources will be represented by strikes or other forms of worker demonstrations.

Therefore there is a need to involve all staff (at least via selected representatives) as much as possible during all the phases of transition:

- During the preparation phase by sharing results of the assessments of performance, illustrating the benefits and obtaining staff feedback and suggestions on specific areas of competence. This should be realized to ensure their active involvement and final “buy-in”.
- During the implementation phase apart from all the training activities related to new FAB operational procedures, staff should be maintained informed about all the milestones reached towards implementation.
- During FAB operations by ensuring continuous involvement of staff after the implementation, through regular meetings and working groups.

Operational staff should have the possibility to contribute to the establishment of the FAB framework at any time, with suggestions and ideas. This input could be channelled through the respective Operational Manager or deputy staff representative and could be brought forward to the FAB management Committee during a working group.

3.5.4 Operational and technical risk aspects

The adoption of a common FAB operational concept is fundamental for the safe and effective realization of FAB operations. This operational concept has been developed within Phase 2 of the DANUBE FAB study and describes the reorganization of the national operational services, roles and responsibilities within the FAB.

No major potential risk has been identified regarding the common application of operational procedures. The main risk identified relates to the ability to put in place in a timely manner the interoperability enablers supporting the distributed architecture. Continuous progress, monitored by the FAB Steering Committee is the most effective measure to minimize this risk.

From the technical analysis carried on in the Strategic and Harmonisation Plan for CNS Assets [10] it results that Romania and Bulgaria are aligned technologically and both have already implemented or have plans to implement the same functions in line with the ESSIP objectives.

4 Conclusions

The DANUBE FAB initiative is based on a well established and consolidated cooperation activity between Romania and Bulgaria, which traces back to 2004, when BULATSA and ROMATSA presented the “Initiative for creating the prerequisites for the establishment of a functional airspace block”.

This long-lasting cooperation has permitted both partners to analyze the main opportunities stemming from FAB creation, as well as the blocking points and necessary amendments to National regulatory frameworks in order to ensure full compliance with EU regulation and the full exploitation of the many opportunities available. Some of these opportunities have already materialized, such as in the common CNS strategy area, where important cost savings were achieved thanks to rationalization of the infrastructure and data sharing.

Other opportunities are expected to be realized in the future, depending on the start of FAB operations and mainly based on an optimized route network designed at a FAB rather than national level, and on the adoption of a common FAB concept of operations. These improvements alone outweigh the necessary pre-implementation and management costs, while other possible initiatives for cooperation will need to be assessed in the future depending on the new requirements coming from SESAR and other EU regulations.

5 Recommendations for Implementation

The overall implementation strategy has to encompass a number of key aspects over 3 main phases as follows:

1. **Negotiation of the scope and operation of the FAB**
2. **Development of an Implementation Plan**
3. **Implementation of the FAB**

5.1 Negotiation of the scope and operation of the FAB

Prior to the development of implementation plans for the new FAB a process of negotiation and agreement between the FAB partners is required, with the objective to establish the actions to be taken, the modalities and responsibilities.

It should be noted that considerable cooperation has already taken place between Romanian and Bulgarian working groups on the development of the previous Phased study of the DANUBE FAB study and that many of the issues have already been explored and developed to an advanced stage. It is proposed that this process should continue and that a structure of working groups and steering committee representing Romania and Bulgaria should interact to further explore and develop the different issues, with the aim of reaching a series of agreements. It is proposed that the negotiation is structured per working group, while final decision and consistency is guaranteed at level of the Steering Committee.

It is envisaged that the negotiations and agreements should consider 2 main criteria:

1. **Mandatory requirements for regulatory compliance**
2. **Optional or discretionary initiatives which involve potential benefits**

The mandatory requirements for regulatory compliance represent the basic minimum requirements that are necessary to comply with the SES regulations. These minimum requirements are already included in the legal agreement between the two countries. This shall be complemented by the ANSP Cooperation Agreement and the NSA Agreement on Supervision, based on the two Memoranda of Understanding signed in 2010 by NSAs and ANSPs respectively.

The creation of the FAB will also create several benefits for the two parties some of which are due to optional or discretionary initiatives (e.g. common procurement of systems). It is envisaged that the inclusion of these initiatives will be negotiated to the mutual benefit of both parties in a Benefit Implementation Agreement. Where appropriate for the most important initiatives, this agreement will include details of the scope of the initiative, the responsibilities of each party and the sharing of benefits. In some instances the agreement may be an understanding to further assess and develop less important initiatives at a later date.

It is envisaged that the priority initiatives to negotiate and agree, will be those with the highest value of benefits and the greatest ease of implementation. Where these initiatives create benefits for both parties, agreement should be relatively straight forward. Where these initiatives create favourable benefits primarily for one party, it may be necessary to negotiate trade-offs.

5.2 Development of an Implementation Plan

Following the negotiation and agreement of the different agreements between the two countries, a detailed implementation plan should be developed. Again, it is proposed that this process should be carried out by working groups activities, reporting to the steering committee with representative stakeholders of Romania and Bulgaria.

It is envisaged that each individual working group will produce an Implementation Plan, which will be coordinated into an Overall Master Implementation plan.

For each work stream corresponding to a group, a realistic implementation plan should be developed that is coordinated between the FAB members; that identifies specific actions to be undertaken, the timescale, responsibility for these actions, as well as identifying and mitigating any risks that could affect implementation.

Actions that are linked to mandatory requirements for regulatory compliance should be prioritised with their implementation programme critical path fixed against the regulatory deadline dates.

Actions that are linked to optional or discretionary initiatives which involve potential benefits should be prioritised in accordance with the magnitude of potential benefits and the ease of implementation; as well as the likely degree of agreement by both parties.

5.3 Implementation of the FAB

It is proposed that the implementation process will continue to be managed through the series of working groups reporting to a steering committee with representative stakeholders of Romania and Bulgaria. For each action or initiative included in the Implementation Plan, an implementation team will be set up to deliver against the relevant implementation objectives.

In parallel with the implementation process a change management and communications programme should be developed. This aims to create a framework for the management of organisational and operational changes and aims to ensure that the staff (and relevant stakeholders) fully buy-in to the changes and are fully involved in the success of the implementation process.

6 Coverage of the tender book requirements

Requirement	Project compliance
In-depth examination of all potential opportunities from the establishment of DANUBE FAB	All opportunities have been identified as benefit initiatives, based on the analysis of current situation of ATS provision in Romania and Bulgaria, the opinions of DANUBE FAB WG experts and the FAB common functions.
In-depth analyses of the related costs and benefits to the opportunities identified	For each of the initiative a cost-benefit mechanism has been developed and validated with DANUBE FAB WG experts.
Identification of the elements required for the justification of the overall added value from the establishment of the DANUBE FAB, subject to the provisions of art. 9.2(d) of Regulation (EC) No 550/2004	The Study provides evidences that the establishment of the Danube FAB brings an overall added value (positive NPV) to the involved stakeholders, in compliance with SES regulations.
To identify and quantify all benefits and costs related to the establishment of the DANUBE FAB in the following areas:	
a. Operational: ATM, AIS and MET	Operational impact has been quantitatively assessed in the CBA. The impact on AIS and MET has been qualitatively assessed in the BC [3.1.3] after having identified with the WG exerts that the impact is more qualitative than quantitative in these areas.
b. Civil-military coordination including the implementation of flexible use of airspace	The impact on civil-military coordination and on the implementation of FUA has been qualitatively analyzed in the BC [3.1.6].
c. Technical systems	The impact on the technical systems has been quantitatively analyzed in the CBA, since common CNS strategy has been identified as a benefit initiative. Common procurement of systems has been retained as a benefit initiative.
d. Safety & Quality Management including Customer relations	The impact on Safety, Quality, Security and Environment management has been quantitatively assessed in the CBA, while the impact on social factors and customer relations has been analyzed in the BC.
e. Legal/Institutional	The impact within the regulatory framework has been analyzed in the BC [3.1.1, 3.5.1].
f. Organizational	The impact on the organizational structure has been included both in the CBA by quantifying the added costs during pre-implementation and implementation phases and in the BC [2.3.2].
g. Economic and financial	The CBA includes a comprehensive analysis of the economic impact on both ANSPs and on the Airspace Users, while the BC analyzes financial aspects [3.4].
h. Human Resources/Operational Staff	The impact on human resources management, social factors

Training & Licensing /Social	and related changes has been analyzed in the BC [3.1.4], while the impact on training has been quantitatively analyzed in the CBA.
i. Security	The impact on security has been included in the both in the BC [3.2.8] and in the CBA within the harmonized management system for Safety, Quality, Security and Environment.
j. Administration of the DANUBE FAB	The impact on administration function has been qualitatively assessed in the BC [2.3.2]
k. Possible common functions identified by the Project Management	The impact implied by the implementation of common functions has been included in the CBA, according to the benefit initiatives identified.
4.1.2 The CBA will fully comply with the requirements of the Implementing Rules on FAB Information Requirements, as contained in the Commission Regulation (EU) No 176/2011 of 24 February 2011, Annex, Part II point 4:	
a. the cost-benefit analysis was conducted according to industry standard practice, using among others discounted cash flow analysis	CBA has been conducted according to industry standard practice and using discounted cash flow analysis. This takes into account the time value of money (i.e. a discount rate) used to compare costs and benefits happening at different points in time as well as a sensitivity analysis of the NPV to different discount rates.
b. The cost-benefit analysis provides a consolidated view of the impact of the establishment of the functional airspace block on all stakeholders including, where relevant, air navigation service providers (civil and military), airspace users (general aviation, aerial work, commercial air transport, state aircraft), airports, national supervisory authorities and regulators; The consolidated position is of primary importance. This rule does not limit building separate CBAs for stakeholder groups to understand the impact on a particular stakeholder group.	After preliminary assessment of the available input data and of the time available for performing the analysis it was decided in accordance with ROMATSA and BULATSA to perform a quantitative assessment in the CBA for ANSPs and Airlines and a qualitative assessment in the BC for military operations, general aviation, airports and NSAs. Both the consolidated position and the individual impact on the different stakeholders' categories have been included in the analysis.
c. The cost-benefit analysis demonstrates an overall positive financial result (Net Present Value and/or Internal Rate of Return) for the establishment of the functional airspace block; CBA measures the overall value added by calculating financial results. A positive Net Present Value or an Internal Rate of Return higher than the cost of capital may be taken to demonstrate that the establishment of a FAB brings additional value.	The CBA demonstrates the overall positive financial result through a positive NPV both for ANSPs and for Airlines, based on the identified areas of impact and on the necessary assumptions. When needed, assumptions have been made in accordance with the most up-to-dated available data regarding, in particular, traffic evolution and operational and technical framework built together with DANUBE FAB WG experts.
d. The functional airspace block contributes to a reduction of the aviation environmental	CBA provides evidences that the FAB contributes to a reduction of the aviation environmental impact at individual

impact.	flight level, thanks to more efficient flight profiles enabled by correspondent procedures and systems. This translates in a financial benefit for Airspace Users and Society as whole due to the cost of NOx and CO2 emissions.
e. Values for costs and benefits, their sources and the assumptions made to develop the cost-benefit analysis were documented.	All the results included in the analysis are based on international reference documents which are reported in the references; the methodology, models, formulas, assumptions and intermediate values are also reported in order to allow reproducibility of results and clarity of assumptions.
f. The main stakeholders were consulted and provided feedback on the costs and benefit estimates which are applicable to their operations.	Stakeholders representatives have been consulted at different stages of the study. At the beginning both ANSPs were consulted and DANUBE FAB WG experts provided their input analysis. At the intermediate stage the same experts provided a feedback on the preliminary results obtained in the study. At the end all the involved stakeholders provided their feedback on the final results through a dedicated workshop in Bucharest. These comments have been integrated in the latest version of the study.
4.1.3 The CBA shall be based on an analysis of the existing inventory of facilities and services and shall identify the areas where the “absolute and comparative advantages” for each ANSP and within the DANUBE FAB as a whole exist	The analysis has been based on the information and data available from the existing inventory of facilities and services, both regarding the current situation (LSSIP) and the future FAB operational concept and architecture (DANUBE FAB documentation). From this information the Study has identified the benefit areas where absolute and comparative advantages for each ANSP and within the DANUBE FAB as a whole exist and has quantified the costs and benefits to achieve them.
4.1.4 As a result from the analysis of the areas stated above the Consultant shall provide different possible outcomes, including the case where minimum additional costs are incurred and maximum benefits are achieved.	After the identification of areas where absolute and comparative advantages exist, different possible options for materialization of benefits have been analyzed and discussed with ROMATSA and BULATSA. The ones retained as feasible have been analyzed and the relative costs and benefits evaluated.
4.1.5. The DANUBE FAB CBA shall use the discounted cash flow analysis technique and:	The CBA used discounted cash flow analysis.
a. include all costs and benefits relevant to its establishment. Potential productivity gains for both ANSPs in terms of human resources, reduce of operating costs etc. Benefits to the operators/airlines, including the savings arising from the more efficient operation, savings of time, more effectively and safely air navigation service	The CBA has quantified all the costs and benefits related with the establishment of Danube FAB according to the specific area and stakeholder impacted. Productivity gains for ANSP in terms of human resources and operating costs are possible in several of the areas indicated as benefit initiatives. Benefits for Airlines in terms of time and distance savings are possible thanks to the new DANUBE FAB route network.
b. use EMOSIA	The CBA has been based on the European Model for Strategic ATM Investment Analysis (EMOSIA), appropriately complemented and tailored to meet the specificity of DANUBE FAB and the needs of the project.

c. encompass 30-year time horizons	The time horizon included in the analysis spans from 2008 to 2030, in line with the Phases of the DANUBE FAB project and as agreed at the beginning of the project together with ROMATSA and BULATSA. The pre-implementation period has been considered from 2008 up to December 2012.
d. justify the discount rate used to derive the financial and economic results – NPV and IRR	A basic discount rate of 4% has been included in the analysis according to the latest version of the EUROCONTROL standard inputs for CBA. A sensitivity analysis to quantify the impact of different values of the discount rate on the final NPV has also been performed.
4.2.1 The consultant will elaborate the Business Case for the Danube FAB with the information from the CBA.	The Business Case for the Danube FAB has been developed, based on the results from the CBA and complementing them with a wider qualitative analysis covering all the impacts implied by the establishment of the DANUBE FAB.
4.2.2 The Business Case should:	
a. Facilitate the co-ordination with all parties;	The Business case presents all relevant information and supporting evidences to allow the DANUBE FAB management structure making the best informed decision making regarding the implementation of the FAB.
b. Contain financial analysis;	The Business case includes financial analysis and indicates the best financing options to implement the DANUBE FAB [3.4].
c. Contain detailed description of the proposal for the DANUBE FAB establishment and provide the rationale for this from among other options, as well as a comprehensive assessment of the benefits, costs and risks;	To complement the CBA, the Business Case contains the description of the best options for FAB implementation [2.3.2], suggests the necessary actions to implement it [5] and identifies the risks associated with the implementation [3.5].
d. Identify and analyse the performance and productivity, as well as the critical success factors for the proposed establishment	The Business case includes an analysis of the impact on performances according to a set of reference KPAs and indicators [3.2]. The main risks, blocking points, critical success factors are identified, analysed and described as well as the actions to maximize the probability of success for implementation [3.5].
e. Identify key risk factors together with the indicators which would alert of changes in results;	The Business case includes an analysis of the key risk factors associated with the implementation of DANUBE FAB, their probability of occurrence, together with the indicators to be monitored for identifying the materialization of the risk [3.5].
f. Indicate the mitigating measures for each key risk factor	The Business case identifies and describes the actions to minimize the probability of risk occurrence and to mitigate its effect [3.5].
g. Assess the consequences for both ANSPs and the human resources	The Business case include an analysis of the impact of the implementation of DANUBE FAB on the ANSPs [2.3.2] and their human resources [3.1.4]

h. Appraise the impact on the air carriers and other users of air navigation services as a result of the investments of both ANSPs	The Business case includes an appraisal of the impact of investments undertaken by ANSPs on Airspace users according to the forecast traffic [3.2.3].

7 References

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