

## **Introduction to the North European Feasibility Study**

**The NEFAB Feasibility Study consists of a set of documentation organised in a binder with separate sections. The sections are set up as described below:**

**Sections I - V are included in the Feasibility Study Report  
Sections VI are attached as separate files/documentation  
Attachments are provided in Section VII**

## EXECUTIVE SUMMARY

In order to improve the overall ATM performance in the North European Area under the umbrella of Single European Sky regulations, the Air Navigation Service Providers Avinor, EANS, Finavia, and LGS initiated the project with the aim to establish the North European Functional Airspace Block (NEFAB). The project is organised into four phases:

- Inception and Decision in principle
- Feasibility Study
- Development
- Implementation

This Feasibility Study report entails the deliverables from the NEFAB project in following the completion of the NEFAB Feasibility Assessment phase (2008 – 2011). The report provides documentation regarding:

- Initiative reports which analyse and propose ways to enhance cooperation and increase performance in the Functional Airspace Block and provide an effective contribution to increased overall European network performance, thereby delivering substantial benefits to the airspace users;
- Development plan/roadmap for the stepwise implementation of the initiatives;
- Socioeconomic analysis presenting both internal and external effects, and;
- Risk identification for the implementation of the initiatives.

The objective of the North European Functional Airspace Block (NEFAB) Feasibility study is to develop documentation to support the formal agreements required by the States, the National Supervisory Authorities (NSAs), and the Air Navigation Service Providers (ANSPs) for the declaration of a North European FAB, comprising the airspace of, Estonia, Finland, Latvia, and Norway.

NEFAB encompasses all airspace in the participating states Estonia, Finland, Latvia and Norway (including Bodø Oceanic FIR) and service provision in all en-route airspace and all TMA's. NEFAB declaration and establishment will not cause any changes in existing Flight Information Regions in the area.

The NEFAB project has identified 12 individual improvement initiatives related to airspace, service provision, support functions as well as systems. NEFAB Business model and NEFAB governance will be developed during the Development phase in 2011, forming the foundation for ANSP agreement.

The NEFAB Feasibility Study has assessed the identified initiatives and opportunities. Considerable improvements can be achieved not only through the optimisation of airspace, but also by closer and more integrated cooperation between the participating ANS providers. The improvements are described as the minimum and performance scenarios for the year 2020 as well as a Vision for the year 2015, representing a snapshot along the development path of either of the optional scenarios.

The final agreed solution may be a combination of the different scenarios, based on the initiatives described in appendices to this report.

## Main result

Both the minimum and performance scenarios are expected to fulfil the requirements as stated in article 9a of the regulation 550/2004, but the higher ambition level of the latter offers the potential for greater benefits, albeit at the expense of greater risks. An approach where the minimum scenario is seen as a stepping stone towards the performance scenario can be envisaged, the NEFAB Vision 2015 might then be a milestone on such a migration path.

NEFAB is expected to fulfil the forthcoming European wide performance targets. The total effect of the establishment of NEFAB is documented in the socioeconomic analysis, demonstrating the overall benefits of NEFAB to the society at large. The analysis is based on inputs from the NEFAB initiatives, SAAM simulations provided by EUROCONTROL, and internal ANSP Cost Benefit analysis.

The overall result of the Socio-economic analysis including external and ANSP internal effects looks as follows:

	Minimum scenario		Performance scenario	
	Year	Value	Year	Value
External cash effects per year (in mill. Euro)	2015	53,7	2015	53,7
	2020	73,0	2020	76,8
	2025	92,8	2025	97,6
Internal cash effects per year (in mill. Euro)	2015	0,6	2015	-1,9
	2020	4,3	2020	12,6
	2025	4,3	2025	12,6
Total external and internal cash effects per year (in mill. Euro)	2015	54,3	2015	51,7
	2020	77,3	2020	89,4
	2025	97,1	2025	110,2
NPV of internal and external effects	2012-2025	304,0	2012-2025	341,3

**Table 1: Overview of external and internal effects**

As can be seen from the table, the expected internal and external cash value of the NEFAB initiative amounts to approximately mill. Euro 50 in 2015. In this case the gains are quite similar in the Minimum and in the Performance scenario.

In 2020 the larger benefits from the implementation of Free Route Airspace above FL195 is clearly seen as the total benefits amount to mill. Euro 89 in the Performance scenario versus the total value of mill. Euro 77 in the Minimum scenario.

In 2025 even greater benefits from the implementation of Free Route Airspace above FL195, in conjunction with the calculated traffic increase, is seen as the total benefits amount to mill. Euro 110 in the Performance scenario versus the total value of mill. Euro 97 in the Minimum scenario.

Finally the NPV for the period 2012 to 2025 amounts to mill. Euro 341 for the Performance scenario and mill. Euro 304 for the Minimum scenario. A discount factor of 10% is used for the NPV calculation.

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# SECTION I: INTRODUCTION

## 1 Background

### 1.1 Functional Airspace Blocks

The Single European Sky sees the establishment of Functional Airspace Blocks as a key enabler for enhanced cooperation of States in improving overall performance and creating multi-national synergies. In establishing such FABs, States are required to comply with the European Commission regulations, specifically Article 9a of the Service Provision Regulation 550/2004, as amended in Regulation 1070/2009.

*“Functional airspace block’ means an airspace block based on operational requirements and established regardless of State boundaries, where the provision of air navigation services and related functions are performance-driven and optimised with a view to introducing, in each functional airspace block, enhanced cooperation among air navigation service providers or, when appropriate, an integrated provider”.*

*Regulation (EC) No 1070/2009 amending Regulation (EC) No 549/2004*

### 1.2 The NEFAB Initiative

During summer 2007, the North European Strategy Committee (NESC) composed of the Chief Executives (CEOs) of the North European ANS providers (NEAP) initiated a pre-feasibility study regarding the viability of establishing a Functional Airspace Block in the northern part of Europe. States committed in the NEFAB inception phase were initially Sweden, Denmark, Norway, Finland, Estonia and Iceland. Latvia became a NEFAB partner during autumn 2009. In January 2011, LRV and Naviar decided to withdraw from the project. In June 2011 the Icelandic state also decided to withdraw from NEFAB.

This feasibility study report is a result of the work carried out during 2009, 2010 and 2011 to provide detailed documentation of the feasibility of establishing a North European functional airspace block composed of the participating States.

### Internal financial effects for the ANSP's

The NEFAB internal financial implications for the two scenarios for 2020 and 2030 are presented in the table below:

	2020 Minimum Scenario	2020 Performance Scenario	2030 Minimum Scenario	2030 Performance Scenario
Accumulated value of cash flow	3,0	42,6	46,4	168,7
Net Present Value (NPV)	-0,3	18,9	11,0	51,8
Estimated break-even point (payback time)	2021	2017	2021	2017

### Airline savings

The following savings have been calculated for the airlines:

	Minimum scenario (FL 285 / 245)		Performance scenario (FL 285 / 195)	
	2015	2020	2015	2020
Airline savings (in mill. Euro)	22,7	31,0	22,7	32,3
	2025	39,4	2025	41,1

### Passenger savings

The key results for the value passenger time savings per year can be summarised as follows:

	Minimum scenario (FL 285 / 245)		Performance scenario (FL 285 / 195)	
	2015	2020	2015	2020
Savings based on NEFAB values (in mill. Euro)	27,8	37,8	27,8	40,1
	2025	48,0	2025	50,9

### Total emissions savings

The key results of the simulations for the emissions savings can be summarised as follows:

	Minimum scenario (FL 285 / 245)		Performance scenario (FL 285 / 195)	
	2015	2020	2015	2020
Emission savings (in mill. Euro)	3,1	4,2	3,1	4,4
	2025	5,4	2025	5,6

## 1.3 Objective of the NEFAB Feasibility Study

The objective of the North European Functional Airspace Block (NEFAB) Feasibility Study (FS) is to provide documentation to support the decision making process by the Air Navigation Service Providers (ANSPs), the National Supervisory Authorities (NSAs) and the States for the declaration of a North European FAB comprising of the FIRs/UIRs of Estonia, Finland, Latvia and Norway (including Bodø Oceanic FIR).

This Feasibility Study report is a key deliverable from the NEFAB project following the completion of the NEFAB Feasibility Assessment phase (2008 – 2011).

The report provides documentation regarding:

- Initiatives which analyse and propose ways to enhance cooperation and increase performance in the Functional Airspace Block and provide an effective contribution to

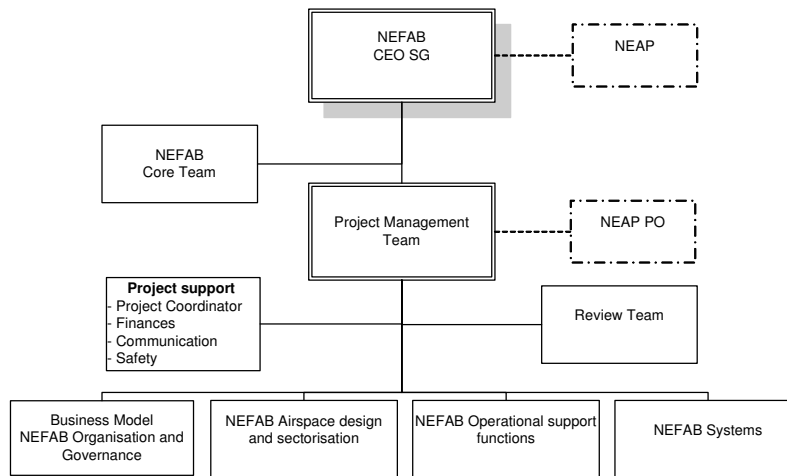
increase the overall European network performance, thereby delivering substantial benefits to the airspace users.

- Development plan/road map for the stepwise implementation of the initiatives.
- Cost-benefit analysis and risk analysis for the implementation of the initiatives.

## 2 The NEFAB Project

### 2.1 Project organisation

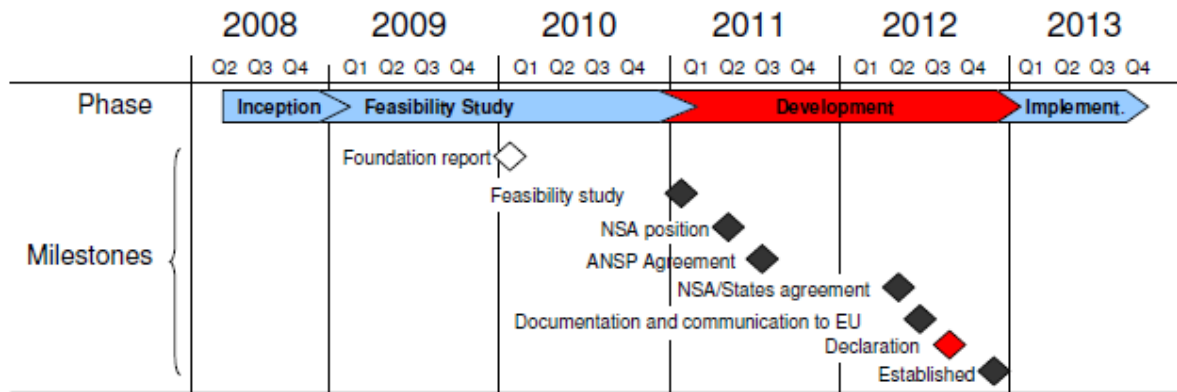
The NEFAB project management team was formally established in April 2009 and in October 2009 the NEFAB Steering Group was created composed of senior managers and advisors from the participating ANSP providers. The Steering Group currently consists of the CEOs from the four participating ANSPs.



**NEFAB project Organization**

The NEFAB Steering Group and Project Management Team worked closely together in 2009-2010 ensuring guidance and quality assurance of the main deliveries from the project. The project team was supported by ANSP subject matter experts (SMEs) and focal points in order to ensure the provision of up to date data and local expertise.

In order to ensure timely compliance with national and EU requirements the following project phases were established in accordance with the EUROCONTROL (PRU) model for FAB establishment.



**NEFAB Project phases - based on the EUROCONTROL PRU model**

## 2.2 Project Framework

### 2.2.1 FAB requirements

Article 9a of the SES service provision Regulation 550/2004 as amended in 1070/2009 sets 9 requirements related to the establishment, implementation and operation of a FAB. As a result of an extensive consultation process during 2010 the European Commission developed an Implementing Rule (IR) on Information requirements as well as high level and lower level FAB Guidance material (GM) in order to support FAB establishment and to ensure the standardised application of FAB performance requirements.

The aim of NEFAB is to comply with the requirements of the Single European Sky and the national transport strategies and increase performance in Air Traffic Management by creating synergies and holistic solutions, thereby reducing the effects of fragmentation.

The EUROCONTROL ATM Cost Effectiveness Benchmarking report (ACE 2008) indicates that most ANSPs involved in the NEFAB project are performing better than, or very close to the European average. However, further improvements can still be achieved by the implementation of a common operational concept, an airspace design unconstrained by national borders and integrated functions or services in several areas of Air Traffic Management.'

### 2.2.2 SESAR - European ATM Master Plan

The SESAR ATM Master Plan developed during the SESAR definition phase was endorsed by the EU Transport Council on 30 March 2009 as the initial European ATM Master Plan. The SESAR programme constitutes the technological pillar of the Single European Sky policy. It combines technological, economic and regulatory aspects and will use the Single European Sky (SES) legislation to synchronise the plans and actions of different stakeholders and bring together resources for the development and implementation of the required improvements throughout Europe, in both airborne and ground systems.

The NEFAB Operational Concept is envisaged to be compatible with the SESAR programme. The Operational Concept can be further developed to gradually encompass the different elements of the SESAR ATM Target Concept and its Concept of Operations as they are deployed. These developments represent a paradigm shift from an airspace-based environment to a trajectory-based environment.

### 2.2.3 Stakeholders expectations

#### State view:

In a Joint Statement issued in Trakai (Lithuania) on 22 September 2010, the Transport Ministries of

the NEFAB States confirmed their commitment to the NEFAB project (in its preparatory phase) and stated, amongst others, that the ANSPs should aim for a somewhat more ambitious approach for their cooperative venture than the "minimum scenario" set out in the NEFAB Foundation report and that services to be centralised should be clearly specified along with the modalities for doing this and analysis of its consequences. Simultaneously the Ministries urged the stakeholders involved in the preparatory work to ensure the involvement of all relevant actors (NSAs, military bodies and stakeholders) in the development of the NEFAB concept.

**NSA View:**

The NSAs of the NEFAB States has highlighted, amongst others, the need to define the NEFAB position in relation to the North Atlantic area. Additionally, the NEFAB project was also requested to address the feasibility of a "mixed-scenario" to mitigate the risks defined for the two scenarios in the NEFAB Foundation report. NSA coordination with regard to the development and subsequent implementation of NEFAB is arranged through a common NSA coordination platform.

**Airlines/IATA's view:**

The airline customers have invested considerable amounts in a modern fleet of airliners with high performance and capabilities within the communication, navigation and surveillance domain exceeding the current capabilities of the ATM-system. At the same time the commercial pressure within the industry is increasing. The introduction of low cost carriers has changed the very nature of the airline industry, fewer passengers are travelling in the premium segment with the traditional network carriers and fierce competition between airlines and airline alliances is the day-to-day reality. IATA's FAB expectations have been requested and are that FABs are expected to:

- Deliver improved cost-efficiency in the current operations as soon as possible;
- Implement technology and operational concepts that can drive further cost reductions;
- Increase capacity to overcome shortcomings and to reduce delays in the current ATM-system as well as taking actions to ensure that the projected increase in demand can be met;
- Accommodate increased demand and deliver cost reduction without negative impact on safety.

**Military requirements**

Generic requirements to NEFAB have been set up by the military stakeholders in the States involved and communicated to the project and will be used as a basis for further development of airspace design and operational concept. The military requirements are included in Section VII appendix 14.

These requirements include:

- There must be a national integrated Area Control Centre in each nation,
- An Air Navigation Service must be maintained in peace, crisis and conflicts ,
- Service Providers must give state aircraft priority when these are carrying out national tasks and services also when operating as GAT,
- Availability of air space for international exercises.

**2.2.4 Performance targets**

As the overriding principle, national or regional performance targets must be in compliance with the 11 ICAO key performance areas listed in ICAO Doc 9883 and used as framework for the performance target setting in the SESAR program. In addition the target setting must comply with EC Regulation 691/2010. It is envisaged that the NEFAB performance targets will be in compliance with the community wide performance targets once these have been set.

The European-wide SESAR 2020 targets are:

- Enable a threefold increase in capacity

- Improve safety by a factor of 10
- Reduce by 10% environmental impact per flight
- Cut ATM costs by 50%

### 2.2.5 NEFAB mission and vision

The following mission and vision has been adopted for the NEFAB-project:

**NEFAB Mission**

NEFAB is an airspace block that is operated optimally for its customers and stakeholders

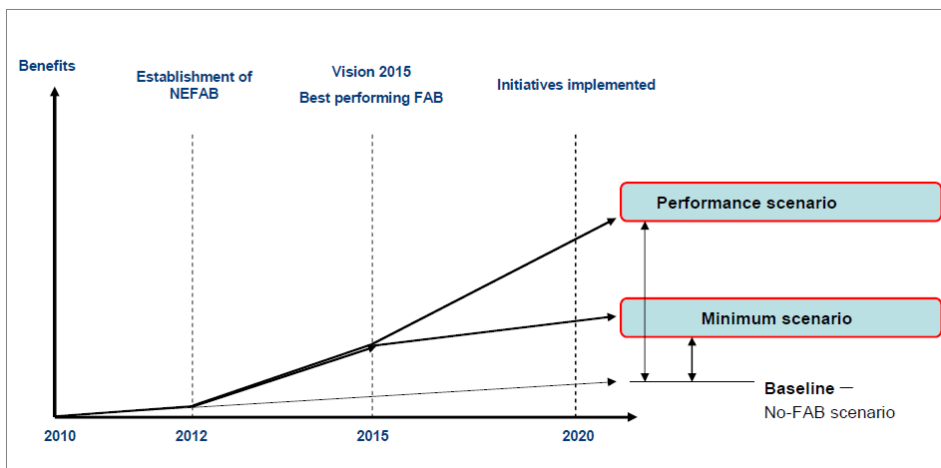
**NEFAB Vision**

**By 2012 NEFAB is established**

**By 2015 air navigation services are harmonised and optimized, and the FAB is the best performing airspace in Europe measured by regional performance targets**

### 2.3 Scenarios

The NEFAB Feasibility study describes a minimum scenario and a performance scenario for the FAB development. Both scenarios are expected to fulfil the FAB requirements, but the ambition levels, potential benefits and risks are higher in the performance scenario. A NEFAB Vision 2015 is also developed as a milestone on the migration path towards the minimum and/or performance scenario. Vision 2015 includes a “mixture” of harmonisation and development activities in order to become the best performing airspace by 2015. The ambitions in these scenarios have been increased compared to the scenarios described in the NEFAB Foundation report (March 2010).



**Illustrative: Milestones and ambition levels for benefit realization**

### 2.3.1 Vision 2015

The purpose of the vision 2015 is to describe ambitious but realistically achievable improvement initiatives to create synergies and "quick-wins". It builds on ongoing developments within the States and converge these into coordinated FAB-wide developments. The airspace design shall be based on operational requirements, without the constraints of national borders, in order to increase ATM performance and deliver substantial flight efficiency benefits.

### 2.3.2 Minimum scenario

The design, implementation and development of NEFAB can be considered as a "window of opportunity" in terms of benefits for the ANSP's and their customers. For each of the initiatives a minimum scenario is developed to describe a set of changes that can be considered as the lower end of this window. The minimum scenario delivers benefits sufficient to satisfy the 9 basic requirements to a FAB through improved airspace and sectorisation solutions, organisation of ATS provision and harmonisation and collaborative initiatives to improve the efficiency of ancillary services and support functions. The minimum scenario is considered realistic and achievable, but the benefits delivered are lower compared to the performance scenario. This applies mainly to the internal ANSP-benefits as the difference between the scenarios in terms of external ANSP-benefits is relatively small.

### 2.3.3 Performance scenario

The performance scenario is developed to describe a more ambitious approach within each initiative. The performance scenario can be considered to represent the higher end of the window of opportunity. In general the scenario describes a closer collaboration between the participating ANSP's including centralisation and integration of functions when considered suitable. The performance scenario provides higher benefits compared to the minimum scenario, but simultaneously the implementation of the scenario involves a higher risk. The performance scenario is developed under the overall assumptions that NEFAB will still be operated through a number of individual ANSP-organisations. However, some of the actions related to centralisation or integration may require organisational changes related to the specific functions.

## 2.4 Initiatives

The study represents possible improvements within twelve defined Initiatives. They include operational and technical aspects of ATM as well as supporting functions and enablers. The Initiatives describe the required steps to reach the vision 2015 as well as the different ambition levels related to the minimum and performance scenarios.

Not all initiatives are interdependent which means that initiatives which are not directly linked to the operational concept can be considered as business opportunities in order to enhance the FAB performance and contribute to the overall added value.

The Initiative Papers are included in Section VII.

## **SECTION II: CURRENT STATE**

### 3 Description of the current situation

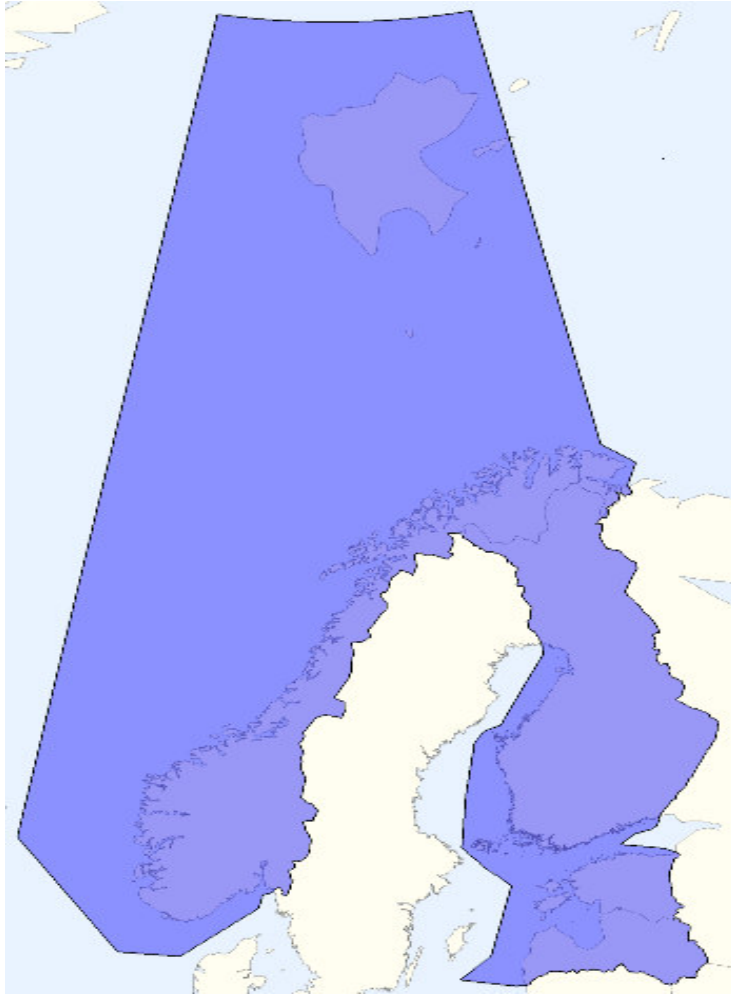
The Air Navigation Services within the NEFAB area are delivered by the individual ANSP's of the different NEFAB states. All of these ANSP's are state owned entities, although with different governance and ownership arrangements. In general the capacity delivered within the area is sufficient to meet demand resulting in very limited ATFCM-delays. A brief description applicable for different areas within the Air Navigation Services is provided below.

#### 3.1 Airspace and traffic

The NEFAB airspace comprises the FIR/UIRs of Finland, Estonia, Latvia and Norway (including Bodø Oceanic FIR). The area contains around 90 airports with IFR operations and around 30 elementary ACC sectors.

The high density traffic areas are in the southern part of the NEFAB airspace and with major traffic flows over the Baltic/Baltic Sea and to/from continental Europe and between Europe and North America. In the east the NEFAB borders to Russian airspace where transitional tasks are performed by the sectors bordering to this airspace. In the northern part of NEFAB there are a large number of regional airports with scheduled IFR-traffic. Off the Norwegian coast there is a substantial amount of helicopter traffic operating to and from the petroleum installations. Domestic traffic in Norway is relatively high and three of the busiest city-pairs in Europe are Norwegian domestic city-pairs.

Sector design is currently constrained by national boundaries, although there are some delegations of responsibility for the provision of ATS in cross-border airspace. ATC sector boundaries are always considered as a key element when new ATS routes are planned. In some cases, optimal solutions for routes can be found, but implementation could be restricted by sector designs not supporting the route change.



**NEFAB Airspace**

### **3.2 Civil and military cooperation**

European Commission regulations regarding the implementation of Flexible Use of Airspace (FUA) concept provide states the possibility of implementing the concept whilst taking into account national requirements. These national requirements differ between the states depending on defence doctrine, military armament and capability status, geopolitical and – geographical situation, alliances and so forth. Additionally, the regulations and their supporting documentation published by Eurocontrol are generic in the specifics of how FUA-concept should be implemented, resulting in a variety of FUA applications. Additional (external to FUA) ATM-related CIV/MIL coordination issues arise when considering all military operations requiring airspace or flight object segregation such as firing ranges, Unmanned Aerial System (UAS)-operations, aerial refuelling operations and the conduct of OAT missions. These operations are also implemented nationally by employing a variety of different procedures or in some cases based on ad hoc tactical procedures.

The Airspace Management Cells, AMCs, manage the booking and allocation of special use airspace, ensuring the effective sharing of airspace through joint civil/military strategic planning, pre-tactical airspace allocation and tactical airspace management. AMC functionality in the NEFAB states has

been implemented to a varying degree between the states. Some states have only recently established an AMC, some states are moving towards tactically operational AMC and some states are yet to establish an AMC function beyond that what is required for Centralised Airspace Data Function (CADF) liaison purposes.

As the level of civil/military co – operation between the NEFAB states on all ASM levels is variable, this leads to inevitable differences in the efficiency of airspace usage. These CIV/MIL inefficiencies in turn affect the efficiency of the NEFAB network as a whole due to fragmented, national ASM solutions. The FUA–operations within the NEFAB–area\*) will be subject to performance assessments and reporting as required by the European Commission. Performance monitoring and reporting is based on KPI's which will be monitored according to agreed parameters throughout the NEFAB–area. Therefore, to enable this performance monitoring, it is a baseline requirement that the application of FUA as well as other CIV/MIL procedures is uniform in all participating states.

*\*) Exemptions may apply in the NAT-region*

### **3.3 Air Navigation Services**

#### **3.3.1 Air Traffic Services – ATS**

Air Traffic Services provided in the NEFAB area are generally harmonised to a high degree with regard to the provision of air traffic control services. The differences in ATC provision mainly arise from the use of different ATM–platforms or specific differences in the environment of operations (application of Free Route, oceanic procedures, etc.). System interoperability between the units is generally based on OLDI (On–Line Data Interchange) messages and procedures agreed in Letters of Agreement. Enhanced coordination functions, such as SYSCO (System Supported Coordination), are not widely applied and cross border procedures are applied on bilateral basis.

ATS–delegated areas are used in interface areas where it would be impractical to transfer the responsibility of the traffic between units due to short sector transit times or other operational reasons. Cross border sectors cannot currently be applied as an airspace solution in these areas.

ATC staffing and resource management principles differ between the states. There are no common guidelines related to sector manning principles. Current ATCO licensing schemes do not enable cross border service provision unless ATS delegation is applied. Sector configuration management is restricted to the appropriate state only.

Traffic/conflict management procedures are generally limited to the Areas of Responsibility (AoR) of the service provider and the immediate interface, with tactical trajectory management based largely on Letter of Agreement procedures and verbal coordination with limited system support. System safety net functionalities do not extend cross border as trajectories are not updated between the units and system parameters are defined in isolation.

Cross border traffic synchronisation procedures are applied in some parts of the NEFAB area, such as Tallinn providing sequencing for traffic to Helsinki – Vantaa. Such arrangements are based on bi – lateral agreements, CDM (Collaborative Decision Making) processes and system support with no NEFAB–wide methodology. ATFCM–procedures are also largely based on bilateral agreements and CDM–processes, based on the environment and capabilities facilitated by CFMU.

#### **3.3.2 Communications, Navigation, Surveillance – CNS**

Some common procedures and projects have been established in the CNS domain between the NEFAB states, such as bilateral sharing of radar data and common working groups. Strategies

related to the procurement, implementation and use of new CNS infrastructure and the procedures this infrastructure enables have, to a large extent, been made nationally.

### **3.3.3 ATM – systems**

Several different ATM–systems are used in the NEFAB area. Thus the ATM–system interoperability between the states is limited mainly to basic functionalities.

### **3.3.4 Safety Management**

The ANSP's within the NEFAB area are operating individual Safety Management Systems. They all satisfy the requirements for ANSP certification according to EU regulations. There are individual differences between the ANSP's within areas like risk assessment methodology, incident reporting and investigation, lesson dissemination, safety assurance and safety improvements and qualitative and quantitative safety indicators.

### **3.3.5 Training**

Training is currently organised differently among the NEFAB ANSP's. The models for financing of ATM training also differ between some of the states. The training plans for initial training are to a large extent developed locally in each state. These training plans are generally made in accordance with the requirements in the EUROCONTROL Common Core Content documentation, but with individual differences based on the needs of the ANSP concerned. The provision of initial training is either done by the ANSP's own organisation or done by entities completely separated from the ANSP. Such entities are in some cases state owned or state controlled or they operate on a more commercial basis. Development training is either provided internally within the ANSP-organisations or bought by training providers on a commercial market. The content of development training varies according to local operational requirements.

### **3.3.6 Charging**

Within the states of Norway, Finland, Estonia and Latvia the en-route charges and Terminal Navigation Charges are determined in accordance with principles set out in the European Regulation EC 1794/2006 on a common charging scheme for Air Navigation Services.

For the states of Norway, Latvia and Finland, en-route charges are collected from the airspace users through Eurocontrol Central Route Charge Office (CRCO). Estonia collects charges through national arrangements. There is one en-route charging zone for each of the NEFAB states.

### **3.3.7 Institutional and regulatory situation**

The European aviation Regulation is changing rapidly, with the European Union becoming its main institutional and regulatory driver. However, the overall legal frame for aviation is the ICAO Chicago Convention and the ICAO SARPS. These regulatory requirements are the minimum baseline for ATM regulation.

The Single European Sky initiative has been developed in line with the obligations stemming from the membership of the Community and its member states of EUROCONTROL and/or ECAC, and it is in line with the principles laid down by the 1944 Chicago Convention on International Civil Aviation (EC 549/2004 item 4).

In the NEFAB area different institutional arrangements exist based on the membership of the States of EU, EUROCONTROL and NATO, however the EU regulatory requirements are applicable in all NEFAB States. In the case of Norway this obligation is based on the European Economic Area (EEA) agreement.

During the Feasibility study phase (2009 -2010) the NEFAB project team has had regular contacts with the Nordic NSA Group, including the Swedish and Danish NSAs. As Sweden, Denmark and Iceland decided not to continue the participation in the NEFAB project, the NSAs of Estonia, Finland, Latvia and Norway continued as a group to assess the Feasibility Study Report. Regular meetings were arranged between the project and the NSA group during the compliance assessment (EC regulation 550/2004 as amended by regulation 1070/2009) of the Feasibility Study Report during and Q2 2011. It is assumed that future joint designation, supervision of NEFAB will be based on the Nordic Regulatory Perspective document, agreed by the NSA meeting in Stockholm on 25th August 2009.

### 3.4 Key figures for NEFAB

#### 3.4.1 Airspace

The NEFAB geographical scope includes the entire airspace of the following States: Estonia, Finland, Latvia and Norway (including Bodø Oceanic FIR).

These FIRs contain around 90 airports with IFR operations and around 30 elementary ACC sectors.

The NEFAB airspace reflects to a large extent the variations in airspace utilisation existing today on a global scale, including dense continental traffic areas, oceanic and low density traffic areas.

#### 3.4.2 Traffic

On the selected traffic sample date (27<sup>th</sup> of June 2008) the number of IFR flights in NEFAB airspace was 3314. The forecast is done through the use of STATFOR high growth model. This gives the following projected traffic figures for NEFAB:

	<b>Flights 20080627</b>	<b>Flights 2015-H</b>	<b>Traffic increase</b>
ECAC	34315	43663	27.2%
NEFAB	3166	3931	24.2%

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	<b>Flights 20080627</b>	<b>Flights 2020-H</b>	<b>Traffic increase</b>
ECAC	34315	54011	57.4%
NEFAB	3166	4898	54,7

#### Distribution of the traffic between ANSPs

This traffic data from the Eurocontrol Performance Review Report 2008 shows the total annual IFR-traffic controlled by each ANSP and the total ATFM delays:

<b>ANSP</b>	<b>Avinor</b>	<b>EANS</b>	<b>Finavia</b>	<b>LGS</b>
<b>Total IFR flights controlled (´000)</b>	552	157	250	215
<b>IFR flight-hours controlled (´000)</b>	315	56	116	66
<b>IFR airport movements controlled (´000)</b>	761	37	279	44
<b>En-Route ATFM delays (´000 minutes)</b>	29	3	1	0
<b>Airport ATFM delays (´000 minutes)</b>	78	0	22	0

#### 3.4.3 Improving the current situation

The current ATM environment in the NEFAB states is subject to some fragmentation resulting from national development and implementation of new structures, systems and procedures. Some coordination and cooperation ventures and forums have been established.

In an effort to meet both the regulatory goals as well as the internal requirements regarding the quality of the provided ATM services, the NEFAB feasibility phase was initiated as described in

section 2 of this Feasibility Study report. During the NEFAB feasibility phase, 12 initiatives were identified and their present organisation and shortcomings as well as potential improvements are detailed in their respective initiative papers and summarised in section 5 of this feasibility study report.

The NEFAB Feasibility Study has assessed these shortcomings and opportunities and found that considerable improvements can be achieved not only through the optimisation of airspace, but also by closer cooperation between the participating ANS providers. The improvements are described as minimum and performance scenarios as well as a vision for the year 2015, representing a snapshot along the development path of either of the optional scenarios.

Charging issues have so far not been addressed by the NEFAB project due to its complexity. However, it is expected that before performance targets will be developed at FAB level (expected for the second reference period: 2015 /2020) charging issues might be included in the future scope of NEFAB.

Even though the initiative deliverables as well as this feasibility report make references to the years 2015 and 2020, these milestones should not be understood as “big bang” implementation steps. Each of the initiatives includes an associated development path to describe the required steps to reach the vision 2015 and the 2020 scenarios. The consolidated development roadmap associated with these 12 initiatives is presented in section 8 of this report.

Following the acceptance of the operational concept and the content of the different NEFAB initiatives - the development phase will be initiated. The development roadmap will be further populated with details in this stage and the individual improvement initiatives will be described in detail in separate project plans. As not all initiatives are interdependent there is room for “cherry picking” in the decision making process to conclude on the elements of the different initiatives, the implementation timelines and the overall composition of the future scenario.

Further details on bridging the gap between the current situation and the envisaged future service concept are included in the individual initiative papers.

## **SECTION III: FINDINGS OF THE FEASIBILITY STUDY**

## 4 Improvements through cooperation

### 4.1 Operational concept

The NEFAB Operational Concept is based on the requirements and principles of the Single European Sky and it can be further developed to gradually encompass the different elements of the SESAR ATM Target Concept and its Concept of Operations which represents a paradigm shift from an airspace-based environment to a trajectory-based environment.

The development of the NEFAB Concept of Operations will aim towards an evolutionary process, taking full advantage of existing and newly developed technologies and taking into account the SESAR roadmap including the relevant Capability levels and Service Levels, as well as the Future ATM Concept of Operations for the North Atlantic Region. The Concept of Operations should be adaptable to the operational environment and scalable to meet the specific needs of the FAB.

The Operational Concept is a core element in the establishment of NEFAB and a core driver in reaching the performance targets in the areas of safety, capacity, cost effectiveness, flight efficiency, mission effectiveness and environment. NEFAB will be considered to be one continuum of airspace with seamless transitions between the ATS-units. The concept will contribute to meeting the needs of the airspace users by delivering enhancements in flight efficiency, military mission effectiveness and capacity in a safe, environmentally sustainable and cost-effective manner for all airspace users and service providers.

The elements of the Operational Concept are interrelated. The concept represents major changes from today's environment and takes advantage of joint efforts in a FAB context to provide a comprehensive service and accommodate all stakeholders. In the context of the NEFAB Feasibility Study the envisaged Operational Concept has been developed around four main elements:

1. Airspace Design;
  - ATS Routes and Free Routes
  - Sectorisation
  - Airspace classification and delineation
  - Military Areas/Flexible Use of Airspace structures
  
2. Air Traffic Services (ATS);
  - Demand and capacity management
  - Sector Configuration Management (SCM)
  - Trajectory and conflict management
  - Operational rules and procedures
  
3. Airspace Management (ASM)/Air Traffic Flow and Capacity Management (ATFCM);
  - Strategic
  - Pre-tactical
  - Tactical

#### 4. Enablers.

- Regulatory framework
- Training
- Functionality and interoperability of systems
- Common information management
- AIM

Three scenarios have been developed in the NEFAB Feasibility study where the 2015 vision should be regarded as a common milestone towards an optional Minimum or Performance scenario for 2020. The NEFAB Operational Concept reflects these migration options in relation to implementation timelines and ambition levels within each of the concept elements.

### 4.2 Airspace Design

The airspace should be considered as one continuum with seamless transitions between ATS-units. The airspace design shall be based on operational requirements, without the constraints of national borders, in order to increase ATM performance and deliver substantial benefits.

NEFAB airspace is based on overall design criteria's;

- Sectorisation unconstrained by state boundaries and/or FIR/UIR
- Free route airspace
- Optimised ATS route network
- TMA interface included
- Stepwise evolutionary approach towards performance driven airspace
- Optimised interface arrangements with neighbouring third states and other FAB's

The 2015 vision is a step towards a performance driven airspace scenario where the network functionality will be enhanced through increased cross-border functionality. ATS routes will be optimised in the NEFAB area to offer more routing options for the airspace users. However, there will also be a Free Route Airspace (FRA) implemented in sections of NEFAB FIRs, where this is deemed feasible within the timeframe, operationally and technically. A lower limit of FRA at FL 285 is used as the implementation baseline. ATC sectors will be adapted to support the optimised ATS-route network/traffic flows as well as Free Route network unconstrained by national borders and/or FIR/UIR-boundaries. As a design principle, cross-border sectorisation, instead of delegation of ATS, is established. A number of sectorisation improvement areas have been defined. These areas are airspace blocks, which can be allocated to existing sectors. The allocation options should be subject to a detailed study in order to find the best allocation solutions. In 2015 military training areas will be realigned, where feasible, to allow increased flexibility in their pre-tactical and tactical use.

The minimum scenario is based on the same principles as the performance scenario, but the Free Route Airspace extension and sectorisation proposals are less ambitious and should be easier to implement, while still providing substantial benefits in comparison to the current environment. In the minimum scenario a fixed route network will be maintained in areas where there is a need to segregate and organise traffic flows, but that will be the case only in the vicinity of major hubs or due to military requirements. FL245 is used as the implementation baseline for FRA. The minimum scenario involves further development of sectorisation as required by the extension of Free Route Airspace and the expected increased traffic demand. The application of the Variable Profile Areas will be the baseline for military training area design.

The key aspect of the performance scenario is that it represents major changes to the airspace design and requires extensive developments and changes from current ATM systems and concepts. The potential benefits are expected to be higher than in the minimum scenario, but the realisation of these is subject to higher risks, both in implementation timelines and costs. Several prerequisites have to be in place in order to implement the scenario. In the performance scenario Free Route Airspace is fully implemented in the continental NEFAB area with FL195 as the implementation baseline. Conceptual change regarding sector design and allocation principles for the continental NEFAB area is foreseen for the performance scenario. Sectors are constructed from air blocks, which can be dynamically allocated and enable dynamic sector configuration management. Terminal Airspace System concept with associated feeder/stacker sectors may be applied. Variable Profile Area (VPA) principles and Dynamic Mobile Areas (DMA), as described in the Advanced FUA Concept of Operations, may be utilised to achieve a high level of dynamicity.

The SAAM modelling performed during the NEFAB Airspace design workshops resulted in the identification of the following potential benefits compared to the reference scenario, based on the proposed ATS-route improvements and the different lower limits set for the Free Route Airspace in the 2015 vision, the minimum and the performance scenario (assumptions and limitations are listed in Section VII – appendix 2:

<b>2015 vision</b>	<b>Per day (all flights)</b>	<b>Per year (all flights)</b>
<b>2015 vision (FL285)</b>	<b>Per day (all flights)</b>	<b>Per year (all flights)</b>
Reduced route extensions	6 321 Nautical Miles	2 307 256 Nautical Miles
Reduced flight time	1 020 minutes	372 139 minutes
Reduced fuel burn	37 928 kg of fuel	13 843 538 kg of fuel
Reduction in CO <sub>2</sub> emissions	126 425 kg of CO <sub>2</sub>	46 145 125 kg of CO <sub>2</sub>

<b>2020 minimum scenario</b>	<b>Per day (all flights)</b>	<b>Per year (all flights)</b>
Reduced route extensions	8 584 Nautical Miles	3 133 317 Nautical Miles
Reduced flight time	1 385 minutes	505 375 minutes
Reduced fuel burn	51 507 kg of fuel	18 799 901 kg of fuel
Reduction in CO <sub>2</sub> emissions	171 689 kg of CO <sub>2</sub>	62 666 339 kg of CO <sub>2</sub>

<b>2020 performance scenario</b>	<b>Per day (all flights)</b>	<b>Per year (all flights)</b>
Reduced route extensions	9 112 Nautical Miles	3 325 712 Nautical Miles
Reduced flight time	1 470 minutes	536 404 minutes
Reduced fuel burn	54 669 kg of fuel	19 954 273 kg of fuel
Reduction in CO <sub>2</sub> emissions	182 231 kg of CO <sub>2</sub>	66 514 242 kg of CO <sub>2</sub>

Developing major airspace changes is a complex and time consuming process, designed to allow systems, processes and procedures to be sufficiently tested and validated prior to introduction, so as

to ensure that the overall level of safety is maintained or enhanced. A step-by-step implementation of new concepts is a likely way forward to create quick-wins and make the changes manageable.

### **4.3 Air Navigation Services**

#### **4.3.1 Capacity provision and resource management**

In the Vision 2015 the ATS provision in this environment is based on defining common sector manning principles, including the potential use of multi sector planner where applicable, for the sectors and sector families. As cross border sector solutions (static) are envisaged in the 2015 airspace design scenario, this will be reflected in the ATCO training and licensing schemes. Common sector manning principles regarding the use of multi sector planners and single ATCO sector manning (low density scenarios) will be developed to ensure optimised service provision in this environment in the NEFAB area. Datalink services will be implemented by 2015 and this will introduce a new way of working to the operational environment, enabling task sharing between the planning and the executive controller and enabling the automation of routine tasks resulting in enhanced capacity. CDM processes, especially at the interfaces of “close-by” airports, will be enhanced to enable timely reaction and selection of appropriate ATS procedures in response to the changing environment.

In the 2020 Minimum Scenario the cross border ATS provision will be based on the 2015 vision, i.e. procedures are based on a static cross border structure. Sector manning and resource management principles are therefore the same as in Vision 2015.

In the 2020 Performance Scenario ATS provision is organised to complement the dynamic sectorisation (cross border where applicable) as designed by the ATS routes and sectorisation initiative. This will enable the application of dynamic demand–capacity balancing scenarios as developed by the ASM/ATFCM initiative. Sectors can be allocated to different units to manage a specific flow during peak/off-peak traffic flows. This functionality can be applied in intra–centre and inter-centre operations as well as in dynamic TMA environment for “close-by” airports. ATS provision in this environment is further enhanced through the use of multi sector planners where appropriate, providing additional tools for optimised ATCO resource management both for peak and off–peak scenarios. ATCO training, licensing and the related endorsements will enable dynamic sector configuration management and grouping of sectors whilst ensuring that the applied sector configuration can be safely managed during periods with both high and low traffic volumes..

#### **4.3.2 Trajectory and conflict management**

In the Vision 2015, traffic and conflict management in Free Route Airspace environment using system support and system safety net functionalities will be enhanced. Flight trajectory will be updated in the downstream sectors as well to ensure the validity of controller monitoring aid parameters with regard to the actual flight path of the aircraft. Coordination procedures will be enhanced by system support, i.e. SYSCO functionalities. Cross border arrival and departure management procedures will be enhanced to exploit the cross border capability with regard to ATS procedures as well as to extend the sequencing horizon to provide for more optimum flight profiles.

In the 2020 Performance Scenario traffic synchronisation, management and conflict management will benefit from the full interoperability of the ATM – systems required to support the enhanced cross border operations. System safety nets function unit – to – unit as they would within a unit providing assurance of safe and transparent operations within the NEFAB airspace and neighbouring FAB’s. Safety net functionalities will support the changing sector shapes and sizes arising from dynamic sector allocation ensuring the safety of operations. Data link service provision is extended

geographically and by including message sets required for traffic synchronisation (AMAN/DMAN connectivity) as well as route and area uplink functionality for traffic entering NEFAB outside the ECAC area and thus outside of the European network and trajectory management area.

#### 4.3.3 ATS in FUA environment

Flexible Use of Airspace in the Vision 2015 scenario has been implemented based on common rules and regulations and increased area modularity requiring similar adjustments to be made the ATS-provision. Area activation and deactivation procedures, access rules, separation criteria and rerouting scenarios will be developed commonly to ensure a consistent level of ATS-provision and common ASM support systems will be used.

In the Minimum Scenario 2020 the ATS FUA principles are based on the same area design principles as in the Vision 2015. However, in 2020 it is expected that the pre-tactical and tactical Airspace Management has been centralised and this will be reflected in the ATS by coordinated rerouting scenarios reducing the need for ad hoc tactical decisions by the ATCO resulting in better overall network functionality.

In the 2020 Performance Scenario FUA is implemented by applying extended area modularity as well as other advanced FUA structures. The ATS provision in this environment is enabled through the use of common ASM tools linked with the ATM-system in order to provide real time airspace status data and coordination facilities to the ATCOs via the primary system.

#### 4.3.4 ASM/ATFCM

NEFAB – wide ASM/ATFCM processes will be established on strategic level in the vision 2015 to enable NEFAB network management and strategic demand-capacity planning reducing network fragmentation caused by the application of local ATFCM measures. A virtually or physically centralised function is established for the coordination of strategic ASM/ATFCM on NEFAB-level. Common ASM/ATFCM procedures will be developed for Free Route Airspace and applied in a uniform manner throughout NEFAB. Operational AMCs will be established in all NEFAB-states and the AMC and FMP functions will be merged on national level. Common ASM tools will be implemented to support ASM in Free Route and ensure information sharing on NEFAB-level. Common application of the FUA concept will be developed for the whole NEFAB area and military area design is based on increased modularity enabling more options in defining the mission specific airspace reservation.

The minimum scenario represents a continuous evolution of the vision 2015 through the application and implementation of systems and services made available to the service providers and airspace users by different Pan-European initiatives. These initiatives may be either driven by regulation or otherwise agreed and as such will need to be implemented regardless of the FAB specific development programmes. Thus there are no specific targets set for NEFAB in the minimum scenario. It should rather be considered a “natural” progression of the ATM-environment.

In the performance scenario the NEFAB-wide ASM/ATFCM processes will be extended from strategic level to pre-tactical and tactical level to enable enhanced network-wide demand-capacity balancing as compared to the 2015 vision. These processes will be managed by a virtually or physically centralised AMC/FMP-unit which forms the NEFAB network management unit. Common airspace planning unit will ensure that the introduction of new airspace structures will be evaluated on a NEFAB level, as well as on regional network level ensuring the continuous network functionality. FUA area modularity is enhanced according to the Advanced FUA principles and the methodology of modular cross border airspace structures is extended to include TMA management.

#### **4.3.5 Operational rules and procedures**

In the current situation, operational rules and procedures differ between individual states and ANSPs. This fragmentation may lead to inefficiencies both for the ANSP's and the airspace users. These inefficiencies constitute constraints to airspace users in terms of planning and operating flights across the different states. In addition there are duplicated efforts related to production and maintenance of operational rules and procedures.

Harmonised operational rules and procedures, with the potential to develop this further into one common set of operational rules and procedures for the entire NEFAB, is expected to reduce fragmentation and remove the current constraints for the airspace users. Through centralisation of the production and maintenance of operational rules and procedures, either virtually or physically, the costs related to these activities can be reduced. This will also contribute to improved capacity and improved safety levels and facilitate the development of harmonised or common training plans within NEFAB.

Harmonised or common operational rules and procedures are considered an important enabler for changes related to ATS routes and sectorisation and for the implementation of cross border sectorisation.

The initiative is based on a set of baseline assumptions related to the regulatory framework which is considered required in order to development harmonised or common operational rules and procedures.

#### **4.3.6 Training**

In the current situation there are both organisational and institutional differences in relation to the organisation of training activities. This fragmentation leads to differences between states and ANSP's that are considered undesirable in a FAB. By removing this fragmentation through more collaborative actions within the training domain, improvements could be achieved in terms of reduced costs, improved quality of services and higher safety levels. In addition the initiative will facilitate implementation of cross border sectorisation and service provision.

Requirements and procedures for training should be harmonised across NEFAB. This may be further developed according to the performance scenario by centralising the development of training requirements, training procedures and training plans based on common operational rules and procedures across NEFAB. The initiative is expected to deliver cost reductions as well as improved capacity and higher safety levels.

Some high-level assumptions are made in terms of the regulatory framework required to enable the harmonisation and potential integration proposed within the training domain.

#### **4.3.7 Ancillary services**

The scope of ancillary services for the NEFAB Feasibility Study has been Aeronautical Information Service (AIS) and Aeronautical Information Management (AIM), briefing services to airspace users and meteorological services. Different states and ANSP's in NEFAB have established different arrangements for the provision of these services and there are also different organisational solutions established.

Through harmonisation and centralisation of functions as well as joint procurement arrangements related to meteorological services, the initiative is expected to deliver internal cost reductions. The initiative describes centralisation of briefing functions, common briefing systems and common AIS databases as some of the benefit enablers within the AIS/AIM-domain. Within the MET-domain, the focus is on common specification and procurement of services considering the fact that the

meteorological services are provided by organisations independent of the ANSP's. Reduced duplication of effort with subsequent reduction in the use of manpower as well as more efficient solutions in relation to software, systems and databases are expected to deliver the benefits in the initiative.

#### **4.3.8 Supervision and monitoring of CNS infrastructure**

Supervision and monitoring of CNS infrastructure in NEFAB can be done in many different ways, and generally speaking the more advanced the solution from a Systems perspective, the more costly it is. The main goal of this initiative is to have unified top-down processes for each ATCC, including a common set of high-level instructions, by which the operational service is supported in the NEFAB area. Specifically the full support of Incident and Continuity management processes need to be aligned.

In the NEFAB 2015 vision supervision and monitoring processes will be aligning based on Best Practice processes, including incident and continuity management. Special/individual arrangements will be made to support specific cross-border areas, as required. Depending on how the airspace is designed specific efforts will be performed regarding supervision of CNS infrastructure in the areas concerned. A common/joint future supervision plan that can be implemented for new equipment will be developed. Agreements will be made regarding supervision at system network level, e.g. joint network and Simple Network Management Protocol (SNMP) supervision. Common supervision will be established using Virtual Network Connect (VNC) for the specific cross-border areas.

With regard to the minimum scenario, full SNMP support at central system level for each ANSP will be established and based on common SLA (Service Level Agreement) services are given equal supervision via SNMP and controlled using VNC. Control and monitoring data will be shared using SNMP interface description at central system level. Thus adjacent system supervision and control can be integrated cross-border. Supervision is arranged by certified organisations.

In the performance scenario the system and resources used for monitoring are based on an integrated Central Technical Management Center supporting the NEFAB ANSPs and a jointly agreed control and monitoring system will be implemented. Control and monitoring data will be shared using SNMP interface description at system/equipment level enabling adjacent system supervision and control by a central unit.

#### **4.3.9 Commonality of CNS and ATM systems**

With regard to CNS and ATM system commonality in the vision 2015 work is continuing to develop common specifications for procurement and mapping of the NEFAB CNS infrastructure. NEFAB guidelines regarding the sharing of information and use of resources will also be developed. Common system strategies and investment plans are developed in order to support the NEFAB Operational Concept. A NEFAB technical governance structure will be established to facilitate decisions and to implement and steer technological improvements.

In the minimum scenario – in addition to the actions taken in the vision 2015 – streamlining of technology/systems utilised, such as ARTAS, WAM, and DME is envisaged. Joint specifications will be developed for systems procurement (individual/joint) and joint evaluation of the effect for the NEFAB environment is initiated each time an ANSP is procuring new infrastructure.

In the performance scenario centralised systems, providing uniform functionality within the FAB, are utilised increasing the quality of data and information flows. Dynamic sector configuration management with the associated system support will be implemented. Dynamic cross-border sectors (both in the en-route environment and with regard to TMAs) require advanced system support to manage the dynamic airspace configurations between systems and to provide the ATCOs with safety nets and traffic/conflict management tools in an inherently complex operational environment.

Advanced CDM processes will be supported by SWIM-enabled information sharing to ensure sufficient lead times and proactive management of the airspace configurations and the network.

#### **4.3.10 Joint evaluation of new technology**

Joint evaluation will enable a more effective use of specialists and other human resources in the vision 2015. In the future service concept increased cooperation and harmonisation is established to pave the way for a common unit that will lay down the foundation for equipment implementation within NEFAB in a coordinated way.

For the NEFAB minimum scenario cooperation for evaluation of technology is increased to lay down the foundation for the planning and implementation of new equipment in a harmonised way. A common plan for joint and/or coordinated evaluation of technology is established enabling the ANSPs to identify areas for cooperation and establishing a common basis for deciding, planning and organising the evaluations based on harmonised strategies/plans for implementing new systems to fulfil common operational requirements.

In the performance scenario, a common unit is responsible for the systems evaluation and implementation within NEFAB.

#### **4.3.11 Common system maintenance**

This initiative describes the possibilities and advantages related to common system maintenance within NEFAB. The rationale is that it is costly for an individual ANSP to maintain such an expertise in the organisation due to the small demand for the specific type of work and the complexity of the tasks to be performed.

As part of the NEFAB vision 2015 harmonisation of maintenance processes will take place according to best practices. This would result in cost savings with reduced planning and implementation costs due to centralisation. By forming common maintenance teams within NEFAB, the specialists can be used more efficiently and cost savings can be achieved as the number of specialists in each individual organisation can be reduced.

In the minimum scenario the maintenance is organised as in the current situation, but maintenance is shared when feasible (applicable to maintenance Level 2 and 3). A common maintenance structure for common systems will be established when feasible in the following areas: Maintenance level 2, spare parts, specialists, ATSEP training and assessment of competency. For maintenance level 1, no major changes are expected, because these activities are more strongly connected to the physical location of the equipment.

The performance scenario builds on the minimum scenario. In the performance scenario it is foreseen that maintenance specialist teams are set up and these specialist teams are dedicated to work on defined system areas within NEFAB. In addition to the actions described in the minimum scenario, the performance scenario includes the development of a common maintenance structure and establishment of common technical training arrangements. Common spare part management and logistics and common use of specialists for defined system areas will also be established.

#### **4.3.12 Joint procurement**

The joint procurement initiative sets up processes through which the NEFAB partners can carry out joint tendering processes in order to reduce the costs of necessary services and commodities and reduce future investments.

The vision 2015 regarding Joint procurement is a natural part and the final step in the technical support chain of NEFAB. Being at the end of the chain, the result of the joint procurement is highly dependent on the outcome of the previous activities in the chain such as a common strategy and planning. It can therefore be argued that the joint procurement process enables the achievement of the financial results planned in the previous steps.

In the minimum scenario, establishing a mechanism for common specifications and harmonised, or common procurements – are expected to result in similar and interoperable systems through specific jointly procured systems (mainly new technology) and services. Sharing of supplier information where possible and separate contracts under harmonised conditions enable benefits through synergy. Common specifications for procurement and procurement documentation will be used when applicable

The performance scenario arrangements for joint procurement are envisaged to be in place and these arrangements will enable perceptible decrease of costs in the NEFAB service provision budget. Additional benefits may be derived through the application of common specifications and procurement documentations, common contracts and expanding common procurement to other areas of cooperation beyond CNS/ATM systems. Identical or centralised systems and shared site solutions supported by common maintenance system by single provider per system or domain can be achieved through advances in common procurement.

#### 4.3.13 Safety management systems

All ANSP's within NEFAB are certified according to the requirements in the European regulations. However there are differences between the individual Safety Management Systems (SMS) that are in operation across these organisations. The SMS initiatives both describes necessary actions considered required prior to the declaration of NEFAB as well as opportunities for harmonisation or integration of SMS in the FAB.

The initiative describes an initial stage of harmonisation at the time NEFAB is moving into operation. The next development step is to establish common SMS processes through a regional SMS group. The utilisation of common software tools, common databases and sharing of safety data is expected to deliver financial benefits. In addition the activities related to the initiative are expected to contribute to improved safety performance. The main drivers for the safety related improvements are increased availability of quality assured safety data, a common software and safety data repository for the transparent exchange and use of safety related data and common analysis when relevant.

#### 4.4 The NEFAB Business model and FAB Governance

A commonly agreed NEFAB business model is the fundament for the development of NEFAB. The NEFAB business model will be developed forming basis for the ANSP agreement.

The Business model is defined as:

- Products and services
- Processes
- Organisation and structure
- Sourcing strategy

The business model will be designed on scenario descriptions, mapping of processes and best practice in business design. Key criteria for the design are cost efficiency, performance and customer orientation.

The design principles for the business model will be based on a process framework defined in order to secure the same way of working across operations within the FAB. There will be focus on core processes, however with necessary coherence to administrative and support functions as well as common strategic planning between all the service providers.

The NEFAB business model and governance will be developed in 2011.

#### **4.5 National defence and security interests**

Member states retain the responsibility and sovereignty of their national territories, designated FIRs/UIRs and the associated airspace for the definition of their own security and defence policies, with the potential consequence that national requirements for the armed forces could differ from state to state. The SES regulations do not affect the power of member states to adopt measures to ensure the availability of sufficient airspace for the purposes of their respective armed forces.

Therefore, the safe and efficient use of NEFAB airspace can only be achieved through close cooperation between civil and military organizations. The representation of national military authorities in the development, decision making and implementation process of NEFAB will ensure a broad consensus with the member states' sovereign responsibilities and their national and international obligations. The NEFAB governance model and regulatory agreements will ensure that the member states may exercise the option to seize full control of their designated airspace in exceptional circumstances, including the functions that have been designated to a centralised unit/function and areas allocated to another service provider for the provision of cross border services.

With regard to the NEFAB specific military requirements; a document containing the draft Nordic military requirements was provided to the NEFAB project through the NSA group and is included as a separate Appendix to this report (see Section VII – Appendices).

#### **4.6 NEFAB interfaces**

The airspace improvements which are to be implemented in NEFAB during the development phase will not place any requirements to third states/FABs with regard to airspace within their area of responsibility. All development projects affecting the interfaces will be developed in coordination with the appropriate neighbors to ensure network continuity and to enable the extraction of additional benefits for the airspace users and ANSPs.

The DK/SE FAB airspace is adjacent to and to a large degree enclosed by the NEFAB airspace. This highlights the importance of coordinated airspace development efforts between these FABs to ensure the overall network functionality. There are no major differences in the airspace strategies between NEFAB and the DK/SE FAB and it can be envisaged that the North European airspace as a whole can be developed in coordination between the FABs.

The common interfaces with the Baltic FAB, UK/Ireland FAB and Icelandic airspace will be taken into account in all airspace developments affecting these adjacent areas and all changes will be implemented in coordination on bi-lateral or international (EUROCONTROL/ICAO NAT) forums.

NEFAB will have the longest continuous boundary with Russian Federation in Europe making NEFAB a key player in maintaining and improving the network between a fast growing market – in Russia and beyond – and the European network. A common strategy for the development of the transition area between the Russian Federation airspace and SES airspace is essential in harmonising the procedures for the NEFAB area.

The interfaces between the NAT ANSP's are managed through the NAT Interface Control Document (ICD). Development of that document is done through the work of ICAO NAT Systems Planning Group (NAT SPG) subgroups. The results from these workgroups will be taken into account when developing NEFAB.

#### **4.7 Social dialogue within NEFAB**

Social dialogue is a necessity in NEFAB. Without timely and well governed social dialogue, there is a risk of unnecessary delay and complications during the implementation and deployment of NEFAB. NEFAB is a complex multi-cultural *change management project* with a high degree of human involvement and a strong bearing on the working conditions of staff.

The NEFAB HR impact assessment looked into five areas valid for the NEFAB project, namely Corporate and Safety culture, Legal matters, Social dialogue and Training.

It was concluded that as a key issue, change management principles need to be understood and applied in a coordinated and harmonised manner. There is a need to establish an active Change Management and a NEFAB-wide Human Performance approach applying best practices in an open and transparent dialogue involving staff, customers and partners.

Human performance is a key element in future performance based ATM in order to achieve the required overall ANSP performance in terms of safety and cost effectiveness. Therefore human resources and human performance aspects, including social aspects, need to be considered and actively managed throughout the NEFAB change and development process.

#### **4.8 Effect of the initiatives**

The effect of the initiatives associated with the feasibility study report is described in the Cost Benefit Analysis and in the Socioeconomic analysis. In addition a separate CBA has been developed for each initiative. These reports are attached in Section 6.

In order to give the reader an condensed overview of the effects of the initiatives per scenario, as well as a possibility to compare the effects of each initiative in respectively the Minimum and Performance scenarios, a comparison table is attached in appendix 15.

## 5 Implementation risks

In the NEFAB Initiative Papers and the CBA a number of (initiative) specific and general risks have been identified that could affect the initiatives and the success of the project itself. The high level risks are related to a number of different internal and external stakeholders and include legal, regulatory, operational, technical, financial, social as well as cultural issues. These risks are summarised in Table 11 in the NEFAB CBA (Section IV), but some of the risks which are not related to operational or technical issues are listed below:

- Institutional risks related to differences in decision making processes and responsibilities within the different ANSPs;
- Differences between the national civil-military co-operation processes and the existing regulations;
- Differences in current ATM system planning (Business Plan) priorities;
- The combination of airspace, regulatory, technological and organisational changes;
- Network fragmentation due to suboptimal arrangements with neighbouring FAB's or third states;
- Differences in available resources for the NEFAB development activities;
- Differences in ANSPs financial situation;
- Staff and trade union resistance to changes and social unrest in the ANSP organisations as a consequence of inadequate change management.

## 6 Socioeconomic analysis

### 6.1 General

The purpose of the socioeconomic analysis is to assess the overall added value of NEFAB for the society at large. The socioeconomic analysis summarises the internal and external effects expressed in a quantifiable manner and in monetary terms. The ANSP internal cost benefit analysis of NEFAB is a part of the socioeconomic analysis.

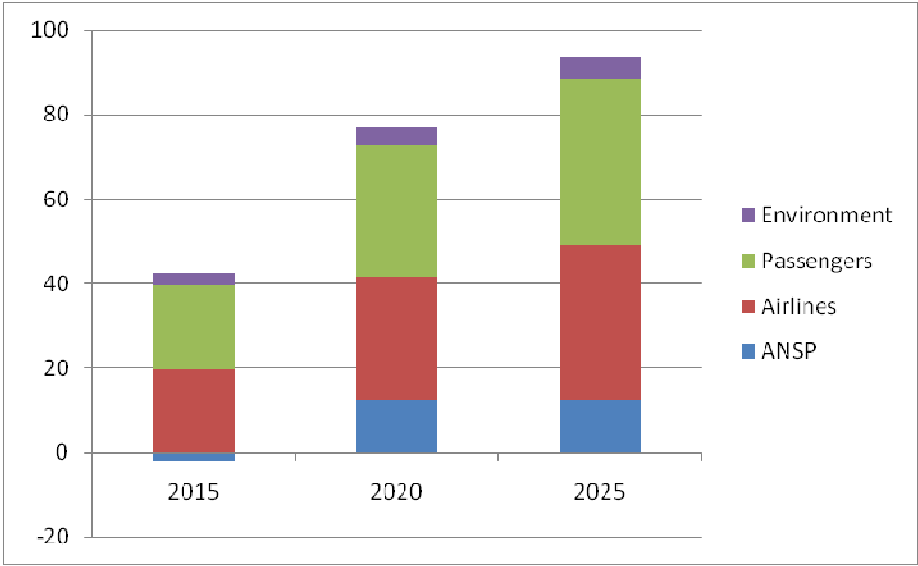
These analyses provide evidence that NEFAB fulfils the EC requirements for establishing a FAB, as set out in SES Regulation 550 Article 9/A. This states that FABs shall:

*“be justified by their overall added value, including optimal use of technical and human resources, on the basis of cost-benefit analyses”.*

### 6.2 Overall results

The expected internal and external cash value of the NEFAB initiative is estimated to be in the range of 40 - 43 MEUR in 2015. In 2020 the total expected cash value is in the range between 64 and 77 MEUR and in 2025 in the range between 80 and 94 MEUR.

The distribution of benefits from internal and external sources can be illustrated as follows:



**Distribution of internal and external benefits (in 1000 €)**

Looking at the Performance scenario the internal net benefit is slightly negative in 2015 due to implementation costs and investments while the external benefits increase to mill. Euro 42,4 already in 2015. The main benefits are related to saved passenger time and airline savings.

In 2020 the internal benefits reach mill. Euro 12,6 or about one sixth of the total benefits. The main benefit remains with the airlines and the passengers.

## **SECTION IV: DEVELOPMENT PLAN**

## 7 Implementation for benefit realisation

To realise the potential benefits in the NEFAB project several activities has to be detailed and developed. In 2011 and 2012 the project shall make the detailed development plan for implementation.

A high level draft development plan is shown in the following table. (The actual activities will however depend on the chosen solution for NEFAB):

ID	Task Name	Start	Finish	2011		2012		2013		2014		2015		2016		2017		2018		2019		2020			
				H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2		
14	<b>Business model and Governance</b>	Mon 07.02.11	Fri 21.12.12																						
15	Business model	Mon 07.02.11	Sat 10.09.11																						
21	Governance	Tue 03.05.11	Fri 21.12.12																						
25	<b>Airspace design</b>	Mon 03.01.11	Wed 30.12.20																						
26	ATS route Improvement Implementation	Mon 03.10.11	Tue 15.12.20																						
29	FRA Airspace implementation	Mon 03.01.11	Mon 01.06.20																						
35	Airspace Classification and Harmonisation 2015	Thu 01.09.11	Wed 30.12.15																						
43	Airspace Classification 2020	Mon 05.01.15	Wed 30.12.20																						
45	FUA Structure design 2015	Mon 03.10.11	Fri 30.01.15																						
51	FUA Structure design 2020	Wed 01.01.14	Mon 01.06.20																						
61	<b>Operational Support Functions Development</b>	Wed 01.06.11	Tue 15.12.20																						
62	04 Optimisation of ASM and ATFCM	Mon 03.10.11	Tue 15.12.20																						
80	05 Ancillary services	Mon 03.10.11	Thu 01.10.15																						
84	06 Harmonisation of operational rules and procedures	Mon 03.10.11	Mon 15.12.14																						
93	07 Optimisation of training	Mon 02.01.12	Thu 15.12.16																						
110	13 Safety Management Systems	Wed 01.06.11	Fri 19.12.14																						
140	<b>Systems development</b>	Wed 01.06.11	Thu 02.12.21																						
141	08 Supervision and monitoring of CNS infrastructure	Mon 03.10.11	Thu 02.12.21																						
152	09 Commonality of CNS and ATM systems	Mon 02.01.12	Wed 23.12.20																						
162	10 Joint evaluation of technologies within CNS and ATM	Mon 03.10.11	Fri 19.12.14																						
167	11 Common systems maintenance	Wed 01.06.11	Thu 18.12.14																						
174	12 Joint procurement	Tue 01.11.11	Mon 25.06.12																						

## **SECTION V: CONCLUSIONS**

## 8 Conclusions

The NEFAB project was initiated by a decision in the North European ANSP Strategy Committee meeting in August 2008, and the project started to mobilise the feasibility study in February 2009. A draft Feasibility Study report was delivered to the NEFAB Steering Group December 2010, but further updated during spring 2011 as a consequence of the change of geographical scope of the project.

The NEFAB Feasibility Study is providing the ANSPs and States in the NEFAB area with material to assess and decide, through 2011 and 2012, a common agreed ambition level to continue the cooperation to declare and establish NEFAB. The final agreed solution may be a combination of the different scenarios, based on the initiatives described in appendices to this report.

NEFAB will be founded on agreements between the ANSPs and between the states. In addition agreements will be established with adjacent FAB's.

The Operational Concept is a major factor in the establishment of NEFAB and a core driver in reaching the performance targets in the areas of safety, environment, capacity and cost effectiveness. The concept will contribute to meeting the needs of the airspace users by delivering enhancements in flight efficiency, military mission effectiveness and capacity in a safe, environmentally sustainable and cost-effective manner for all airspace users and service providers.

NEFAB shall contribute to the improvement of the overall EU wide performance of air navigation services and network functions for general air traffic as stated in EU Commission Regulation 691/2010. Monitoring of the performance at FAB level shall be in force at the latest in the second reference period of the regulation (2015 – 2019) with FAB-level defined KPIs within areas of Safety, Environment, Capacity and Cost-efficiency.

With respect to the overall results for the Minimum and Performance scenarios, it is deemed that both scenarios are fulfilling the requirements stated in Article 9a of the Service Provision Regulation 550/2004, as amended in Regulation 1070/2009.

Documentation and argumentation for the fulfilment of the requirements are described in this FSR Appendices 2-13 (the Initiatives), Appendix 15 and the Socio-economic study chapter 6.

The EU wide key performance targets were endorsed by SSC in December 2010 for the first reference period (2012 – 2014). At present there are no firm indications of the KPIs in the second reference period, which will be the first full reference period for NEFAB. Using the KPIs for the reference period 1 (2012-2014) the NEFAB ANSP's deem that in the areas of Safety, Environment and Capacity, NEFAB will contribute to performance improvement and fulfil the European wide targets. Documentation and argumentation supporting this is described in the FSR Appendices 2 and 13 (Safety), Socio-economic Study chapter 6.6 (Environment) and FSR chapter 4 (Capacity).

Airspace users will benefit from improvements implemented through the different initiatives in NEFAB. The main quantifiable parameters are shorter routes, reduced flying time, reduced fuel burn and reduced emissions. Specifically the airspace design in conjunction with an efficient air traffic service, optimising the flight profiles, will provide major improvements.

Argumentation for this can be found in FSR chapter 4 and in the Socio-economic study (Chapter 6)

**NEFAB is considered to be a sound business idea, fulfilling the EU requirements and resulting in benefits for the states, environment, ANSP's and their customers.**

## **SECTION VI**

# **COST BENEFIT AND SOCIOECONOMIC ANALYSES**



## **SECTION VII: APPENDICES**

## Overview of appendices

- Appendix 1 Operational Concept
- Appendix 2 Initiative 1 - ATS Routes and Sectorisation
- Appendix 3 Initiative 3 - Optimisation of ATS
- Appendix 4 Initiative 4 - Optimisation of ASM/ATFCM
- Appendix 5 Initiative 5 - Optimisation of Ancillary Services
- Appendix 6 Initiative 6 - Harmonisation of Operational Rules and Procedures
- Appendix 7 Initiative 7 - Optimisation of Training Services
- Appendix 8 Initiative 8 - Supervision and monitoring of CNS Infrastructure
- Appendix 9 Initiative 9 - Commonality of CNS/ATM Systems
- Appendix 10 Initiative 10 - Joint evaluation of technology within CNS and ATM
- Appendix 11 Initiative 11 - Common System Maintenance
- Appendix 12 Initiative 12 - Joint Procurement
- Appendix 13 Initiative 13 - Safety Management Systems
- Appendix 14 Military requirements to NEFAB
- Appendix 15 Fulfillment of the EC regulation 550/2004 Article 9/a
- Appendix 16 Benefits and costs for the initiatives pr scenario