Study

JAS 2020

Perspective on the future Dutch ATM system

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Joint ATM System 2020

Perspective on the future Duttch ATM system

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Executive Summary

A. The Single European Sky framework significantly impacts Air Traffic Management in the Netherlands, its reach extends from the sustainable growth of Schiphol to the execution of military functions and to the Dutch economy itself

- The accessibility of Schiphol, its role as a hub for AF/KLM and its sustainable growth are of primary importance for the development of the Netherlands. Even more important than the direct contribution of the hub to the Dutch economy – between 1 and 1.5% of GDP and roughly 90,000 jobs – is its indirect contribution to the economic and political relevance of the Netherlands. The efficiency and the operating conditions of Schiphol are a key factor in the decision of AF/KLM on allocation of flights, capacity and connectivity between AMS and PAR, and ultimately on the network the Dutch economy can rely upon. The ATM system plays a key role in securing these accessibility and efficiency

- The Dutch ATM system is linked with the developments at EU level – including SES, SESAR and the broader FAB discussion. The specific Dutch situation is shaped, at national and international level, by the following parties: Eurocontrol, MUAC, Ministry of Transport, Ministry of Defense, IVW-NSA, LVNL, Mil ANSP and MAA. The users, the communities around Schiphol and the Ministry of Environment also influence the national ANSPs and the Ministries of Transport and Defense, which, however, remain responsible for the final decisions

- In the current setup, very few incentives or possibilities exist for the ANSPs to work in an efficient way, mostly due to the cost recovery mechanism and the fragmentation of airspace between countries and between civil and military users

- The European Regulation on the Single European Sky (SES) calls for a radical redesign of the European airspace, with reduction of costs and of ATM fragmentation as its main focus. The military ATM is not fully bound by the SES legislation, but their participation is sought and desired. The Netherlands has committed itself to the SES package. This commitment must be considered irreversible, and the Dutch military has actively participated in its development. For the military the creation of larger cross border training areas over land will result in increased mission effectiveness and efficiency, ready to meet the requirements of future generation aircraft

- SES offers a unique opportunity for the development of Schiphol, whilst meeting military requirements. It strongly contributes to the minimization of the environmental impact, allows for improved operating conditions and

capacity expansion and allows to satisfy the direct needs of the major users (civil and military), delivering the required increase in capacity and flexibility at lower costs. Thanks to the "better flying" and the reduction of operating costs brought by a FAB integration and by a close cooperation of civil and military, it will be possible by the year 2020 to reap system benefits between EUR 760m and EUR 980m annually in the countries currently participating to FAB Europe Central discussion[1]

B. The Dutch ATM system's current market structure and regulatory framework are insufficient to fulfill national growth needs and military training requirements and cannot take advantage of opportunities offered by SES

- The Dutch ATM system has been assessed against the expected growth of Schiphol (3% annual growth in passengers by 2020) and the SES objectives (enhancement of capacity corresponding to a 3-fold increase in movements, 10-fold safety improvement, 10% reduction of environmental impact and 50% reduction of cost). Also key in the assessment have been the indispensable preconditions to the sustainability of the system, as expressed by users and stakeholders. If not stated otherwise, the analysis and its results are valid equally for civil and military ATM

- The evaluation of the Dutch setup against the key preconditions and the expected developments has found it to be inadequate:
  - The optimal accessibility of Schiphol cannot be guaranteed without much closer linkages with the neighboring countries
  - The current setup does not allow the implementation of the cornerstones of SES, namely separation/unbundling of functions, cross-border coordination and push for consolidation
  - Present and future military training requirements cannot be met

- The main limiting factors (civil and military together) are:
  - Lack of absolute separation of regulation and operations;
  - Current supervisor is too dependent on the ANSP(s);
  - Multiple responsibilities of the ANSP(s) cloud focus on operational efficiency;
  - The ANSP(s) are not able to cross-participate as a means to facilitate international cooperation / restructuring of assets;
  - Lack of incentive(s) for ANSP(s) to reduce their costs
  - Fragmented responsibility for airspace design (civil and military) in the Netherlands

[1] *The Netherlands, Belgium, Luxembourg, Germany, France and Switzerland*

C. The acceleration of European cooperation and introduction of market mechanisms are in the Netherlands' best interest

- We recommend three key changes to the current Dutch setup:

1. The introduction of management contract(s) for the provision of ATM services, with clear incentives and mechanisms to ensure that the service provided is cost-effective, safe and in line with the environmental policy of the Government.

   Different contracts should be put into place for different layers of airspace: the TMA-CTR one with a stronger local character and focus on noise and emission reduction, the LAS one with more emphasis on cost-efficient reduction and management of complexities and explicit focus on cross-border consolidation and integration. The UAS will also benefit from the introduction of a management contract. The Dutch initiative in the LAS and TMA-CTR will help shape the discussion on the formulation of the UAS contract. In any case the scope of the contract cannot be smaller than the area controlled today by MUAC – indeed, all efforts should be made to enlarge this area.

2. The introduction of a knowledgeable and strong Dutch Aviation Authority on ATM (DAA-ATM), clearly separated from operations, able to support definition and optimization of the management contract and the periodically review of the performance of the designated operator.

   Given European developments It is possible that some of the functions that should be delegated today to the DAA-ATM will be delegated at a later moment to other entities, possibly Pan-European. This makes even more urgent the setup of this structure, so that a stable position in the Netherlands can be achieved before any responsibility is handed over.

3. Civil and military co-operation should be pursued to the fullest extent. Failing to do so will significantly hamper the realization of the functional, economic and environmental benefits. Full integration is required for policy, regulation and supervision, as well in key indirect functions like airspace design, infrastructure and systems – preferably under the umbrella of the DAA-ATM. Direct operations should be co-located.

- The DAA-ATM should report to the Ministries of Transport and Defense, and include the Ministry of Environment when necessary. An internal consultation body should act as platform for the discussion with the stakeholders. The DAA-ATM should be able to ensure the independence necessary to balance the system. It is crucial that the DAA-ATM can rely on internal know-how in order to carry out its tasks and therefore be able

to attract industry specialists. The analysis to explore the implications and consequences of the set-up of the DAA-ATM on the aviation value chain is required.

- An acceleration of the FAB integration is completely in line with these recommendations and should be actively pursued: only the integration of the Dutch airspace with the neighbors' can secure the optimal access to Schiphol and accommodate military airspace requirements . The management contract is an efficient platform for this.

- A number of other activities currently undertaken by the ANSP could be open to a free market regime without the need for close Governmental steering guaranteed by a management contract – e.g. Meteo, or maintenance and support of the CNS or of infrastructural hardware and software.

Executive Summary

A. The Single European Sky framework significantly impacts Air Traffic Management in the Netherlands, its reach extends from the sustainable growth of Schiphol to the execution of military functions and to the Dutch economy itself

A1. Air Traffic Management in the Netherlands is interlinked with Single European Sky (SES) and Mainport Schiphol developments, and influenced by various players

The Netherlands have an intrinsically vested economic interest in maximizing continuous air access to Mainport Schiphol

One of the most significant economic success factors of today's Netherlands is its highly effective multimodal logistical system that combines Europe's largest deep sea port (Rotterdam) and Europe's fourth largest airport (Mainport Schiphol, Amsterdam) with a high-end road and rail system. This network has afforded the Netherlands an economic and political relevance far beyond the expectations of its size and otherwise. While Mainport Schiphol cannot rely on a catchment area like London or Paris, it owes its significance to its ability to act as a gateway for transfer traffic to and from Europe, particularly transatlantic. The role of Mainport Schiphol as a key enabler and driver of the Dutch economy cannot be overestimated – certainly many European businesses which have built their headquarters in the vicinity recognize Mainport Schiphol's caliber.

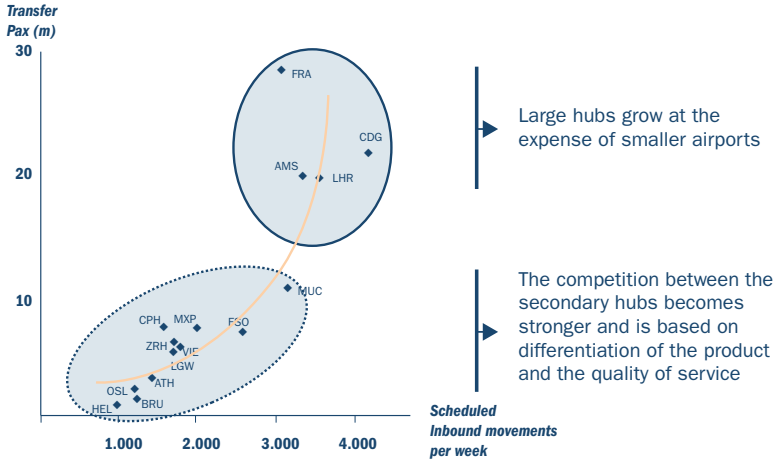


Figure 1: Selection of airports – correlation between inbound movements and transfer pax, 2005 (source: OAG, Roland Berger)

Mainport Schiphol's position as a hub for AF/KLM is key to its economic impact. In 2006, AF/KLM contributed 50% of the air traffic through Mainport Schiphol,

with 211,829 scheduled and unscheduled movements[2]. In the same year, around 42% of Mainport Schiphol's 46 million passengers were transfer passengers, with KLM alone totaling around 15.7 million and therefore responsible for 82% of all transfer passengers at Mainport Schiphol[3]. Comparing its share of transfer passengers to that of other hubs – 35% for Heathrow, 32% for Charles de Gaulle and 54% for Frankfurt[4] – the importance of transfer traffic and AF/KLM at Mainport Schiphol is indisputable.

Figure 1 shows that an increase of inbound movements exponentially triggers transfer passengers, allowing for additional growth. In Europe, a clear distinction can be seen between these main hubs, which continue to grow at the expense of smaller airports, and secondary hubs, where fierce competition results in a more difficult position for all players. Since the gap between these two categories is widening, it is of utmost importance that Mainport Schiphol continue to operate as a main hub in order to maintain its importance in the Dutch economy.

The Netherlands Bureau for Economic Policy Analysis (CPB) has calculated that Mainport Schiphol contributes a significant 1-1.5% directly and indirectly to the GDP[5], with direct and indirect employment between 80,000 and 100,000 positions. Through its extensive network, serving 155 scheduled destinations in Europe and 114 intercontinental destinations, Mainport Schiphol attracts major international companies to the area and helps secure the prosperity of the Dutch populace. Forecasted growth of Mainport Schiphol – in traffic and passengers – indicates that Mainport Schiphol will not only continue to be vital for the Dutch economy, but even grow in importance.

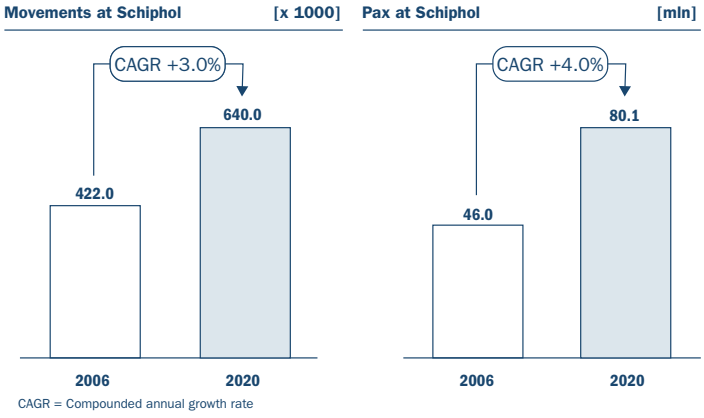


Figure 2: Growth forecast Mainport Schiphol
(source: LVNL, Mainport Schiphol, KLM, Martinair, Transavia)

[2] *Statistical Annual Review Amsterdam Airport Schiphol, 2006*

[3] *LVNL, Mainport Schiphol, KLM, Transavia, Martinair, 2006*

[4] *Fraport, 2007*

[5] *GDP: Gross Domestic Product*

The EU is pushing for consolidation of the European ATM landscape through its SES framework. The Netherlands has committed to this development
With the SES framework, all EU countries have committed to a package of regulations that will ultimately result in the de-fragmentation of ATM and a reduction of air navigation providers in Europe.

Currently, European airspace is designed along national borders. Each airspace being differently designed, managed and operated causes a highly fragmented European ATM system[6]. Users of the system can experience significant differences within a relatively small airspace. For example, in close proximity to the Maastricht airport are three other international airports (e.g. Liege and Geilenkirchen). Each is operated by a different ATC organization. A pilot crossing this small piece of airspace – over the course of only a few moments – will have to communicate with at least three different air traffic controllers.

SES will facilitate the establishment of an harmonized regulatory framework for ATM transport as a means to ensure de-fragmentation of the European airspace, which currently is a major cause of inefficiency and constrained traffic growth. Restructuring and consolidating European airspace will more efficiently and cost-effectively accommodate traffic flows without the limits of national borders, and will harmonize the ATM system. In addition, SES recognizes the need for further collaboration with the military to resolve the constraints of the location of military airspace. Although the military are not bound by SES legislation, their participation is sought and desired.

Current situation

- More than 30 ANS providers/60 control centers, even higher number of software packages, operating systems, cultures
- Lack of common targets, lack of harmonized information management systems

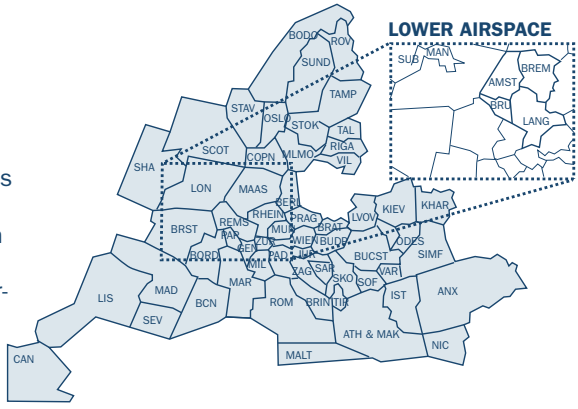


Figure 3: Fragmentation in Europe - Areas controlled by European Area Control Centers (source: EUROCONTROL)

[6] *ATM system is defined as the players and functions related to three categories: policy & regulation, supervision and operation. An ATM system does not include the users of the system*

SES is governed by a package of legislation that was agreed upon between the European Parliament and the Council. It became effective on April 20, 2004.

- *The framework regulation (549/2004)* sets out the overall objectives of the SES initiative: "to enhance current safety standards and overall efficiency for general air traffic in Europe, to optimize capacity meeting the requirements of all airspace users and minimize delays".
- *The service provision regulation (550/2004)* aims to ensure that common standards for the provision of air navigation services are applied throughout the EU.
- *The airspace regulation (551/2004)* addresses the organization and use of airspace in the area covered by SES. The regulation aims to develop common procedures for ATM design, planning and management.
- *The interoperability regulation (552/2004)* concerns interoperability of systems, constituents and associated procedures of the European ATM network.

When these regulations came into effect, the Single Sky Committee was established (with two representatives for each Member State). The Committee works with the Commission to develop the implementing means of the package. The airspace regulation addresses as key implementing measures the establishment of Functional Airspace Blocks (FABs) and associated common principles and the development of rules on Flexible Use of Airspace (FUA). The service provision regulation addresses the development of rules for a common charging scheme. The current package focuses (not exclusively) on Upper Airspace (above FL 285). The reorganization of the system will occur bottom-up (i.e. through the Member States and their ANSPs) and the progress of SES implementation is subject to temporary reviews by the EU Parliament and Council. The first review report was due April 20 2007, and a report is due every three years thereafter.

The Netherlands has adopted the SES package and its implementing legislation, and has committed to the timeline and tasks that follow. Steps towards implementation have already been taken in recent years. The Dutch Parliament approved with regard to the implementation of SES in September 2007 the change of the Aviation Act (Wet luchtvaart) and the Act for the Dutch meteorological service provider KNMI (Wet op het KNMI). As well as the establishment of a National Supervisory Authority and developments towards the creation of a Functional Airspace Block with its neighboring countries. The Dutch military, though not fully bound by SES legislation, has actively participated in its development and actively seeks avenues for further civil – military co-operation.

Although the European ANSPs and Member States all endorse Single European Sky and see the need to reach its objectives, different views exist on its interpretation. Fundamental questions, such as deciding on which and how many countries should be involved in the different FAB discussions, and whether or not the States or the ANSPs should be in the driver's seat, are answered differently in different countries. Also, the speed of developments and sense of urgency

for action are not always aligned, sometimes not even between ANSP and government within a country.
Some countries believe national ANSPs should continue to exist, for instance for reasons of national sovereignty, while others support a possible rationalization of the system, resulting in fewer ANSPs than nations in Europe. Several ANSPs push towards privatization of their business to prepare for cross-border expansion, while others are comfortable to remain a part of the Ministry of Transport with only limited interest in operating in a business environment. Many of these differences will be discussed and overcome in the existing working groups, but their background must be understood to maintain the momentum that the SES initiative has instigated.

The Netherlands therefore must determine its position in the European ATM landscape in order to reap the potential benefits of SES.

The players in the ATM system each contribute in a different way to the structure of the system

Any ATM system is made up of players that drive that system. It is vital to incorporate into any understanding of this system the fact that not only national but also international players have a significant role and influence its structure. Each player contributes in a specific way.

The most important players for the ATM system in the Netherlands are:

- The European Commission (EC)
- EUROCONTROL
- Maastricht Upper Area Control Centre (MUAC)
- The Ministry of Transport, Public Works and Water Management
- The Transport and Water Management Inspectorate (IVW-NSA)
- The Ministry of Defense
- The Military Aviation Authority (MAA)
- Air Traffic Control The Netherlands (LVNL)
- Military Air Navigation Service Provider (Mil ANSP)
- The Royal Netherlands Meteorological Institute (KNMI)

The Ministry of Environment (VROM) is not added as a player since it is not part of the makeup of the Dutch ATM system. However, this Ministry does influence certain environmental issues, such as the noise and pollution restrictions in close proximity to an airport – and should therefore be considered a kind of secondary player.

Other States and their ANSPs are not included among these “players” because, although they do significantly influence the Dutch ATM system, they do not directly contribute to its fundamental structure. The users (e.g. airlines, the military and recreational users) do express their needs, but the Dutch State and the national ANSPs decide upon the actual system.

The international players in the Dutch ATM system are the EC, EUROCONTROL and MUAC:

- EC: The SES regulations are mandatory EC regulations. The Netherlands has committed to future developments such as FAB and SESAR (joint definition and development of the European next-generation air traffic management technology). The Netherlands must prepare the structure of its system for a FAB and for the alignment of infrastructure and systems. This decision is irreversible.
- MUAC and EUROCONTROL: The Netherlands has agreed that MUAC provides air traffic services in its Upper Airspace, an organization built by agreement between the EUROCONTROL organization, the Benelux countries and Germany. Developments and decisions within MUAC and EUROCONTROL therefore play a part in the structure of the Dutch ATM system.

The national players in the Dutch ATM system are the Ministries of Transport and Defense, IVW-NSA, LVNL and the Mil ANSP:

- The Ministries of Transport and Defense: Final responsibility for the ATM system lies with both Ministries. The final design of the system also falls under their responsibility.
- IVW-NSA: The supervision and enforcement of the civil ATM system is performed by the IVW. Due to regulatory requirements set by the EC, the aviation part of the IVW will be stated as and further transformed into the NSA.
- LVNL and Mil ANSP: The ANSPs are the organizations that provide the operations of the ATM system (together with MUAC).
- MAA: The policy making, supervision and enforcement of the military part of the ATM system[7]

A2. ATM is one of the few levers remaining which can meet the needs of a growing Mainport Schiphol, a developing SES framework, and the needs of airspace users

Maintaining and expanding the hub at Mainport Schiphol is vital to its growth
Expansion of the hub and spoke system at Mainport Schiphol faces a major challenge in the availability of ground and airspace capacity as well as environmental constraints. If possibilities remain limited, carriers might reconsider expansion or even continuation of operations at the hub. Such losses will undoubtedly result in a significant drop in Mainport Schiphol's competitive position as well as its contribution to the Dutch economy.

[7] *The MAA bears responsibility for the integrated military aviation system (Airworthiness, Aircraft Operations, Aerodromes and Airspace)*

AF/KLM utilizes both Charles de Gaulle and Mainport Schiphol as its major transfer hubs. To ensure a viable future for AF/KLM at Mainport Schiphol beyond that date, optimal operating conditions need to be provided at Mainport Schiphol for this carrier. This can only be assured through optimal cooperation along the whole of Mainport Schiphol's value chain (the carrier, airport and ATM).

The key success factor of any transfer network is the quality of its offering: connecting global city-pairs as quickly and reliably as possible. Similarly, the value of any airline's network can be measured by its connectivity, namely its capacity to offer passengers considerable connecting traffic.

It is not inconceivable that a carrier suspends or decreases its operations at Mainport Schiphol in the future. The decision to expand or suspend AF/KLM operations at the airport will solely be based on business dynamics, which to a large extent are influenced by capacity possibilities. Suspending hub operation entirely is not unprecedented and is not necessarily the result of airline bankruptcy (as was the case in Brussels and Zurich). In January 2005, Delta closed its 25-year hub operation at Dallas/Forth Worth, leaving airport operations at about 50% capacity for some time. An airport, and the country in which it is located, should no longer assume that its hub status is secure.

Additional airspace capacity is necessary to the growth of Mainport Schiphol, and ATM improvements will enable expansion

ATM is key to the growth of Mainport Schiphol as it will allow for the more efficient use of airspace. ATM is typically determined by procedures and perational concepts, and is therefore far easier and faster to adapt to changes than ground infrastructure. Adaptations through ATM will more easily generate the additional capacity needed to increase throughput at the airport.

ATM can also optimize the utilization of capacity, taking local laws and regulations into account. Approach and departure routes and procedures can be implemented in a way that satisfies the needs and requirements of as many stakeholders as possible: not only airlines but also surrounding communities. As needs and requirements change over time, ATM can adapt its procedures and routes to the changing situation more readily than ground infrastructure solutions. If deemed necessary, ATM could even revert to previous working methods, which is not possible through the construction of additional runways.

ATM plays a central role in minimizing the environmental impact of the aviation industry

The environmental impact of air transport (noise and emission) is an aspect that is always taken into account when considering and working

towards Mainport Schiphol's growth. Collaboration between all players in the value chain – including airport, airlines, ATM and policy makers – is key to addressing environmental issues that affect Mainport Schiphol and its neighboring areas.

Through the design of optimized flight patterns and flying procedures, and through the development and implementation of new technologies, ATM plays a central role in keeping environmental burden to a minimum. Optimized flight patterns in an airport's surroundings keep noise and emission nuisance within legal boundaries, such as defined in the Schiphol Law. The International Air Transport Association (IATA) estimates that current fragmentation in European ATM results in airlines burning 12% more carbon dioxide in the European atmosphere than necessary[8].

Users of European airspace demand improvements to the system on several levels, calling for the advancement of Dutch ATM

Increased and more flexible airspace is needed to accommodate both civil growth as well as fluctuations in military demand

The various airspace users need and use airspace in different ways, ways which sometimes conflict. To accommodate growth in civil traffic and to meet the need for increased volumes of airspace for the military, better utilization of airspace is required. Over time the use of additional (cross border) airspace is necessary.

With civil traffic expected to grow approximately 3% per annum in Europe[9], traffic demand is forecasted to be around two times higher in 2020 than in 2005. Especially strong growth in distinct market segments such as business jets and low-cost airlines will put a strain on available airspace.

For the military, the key success factor is mission effectiveness: timely and flexible availability of suitable, sanitized training areas within a short flying distance from base. The next generation of fighter aircraft, which will be capable of multiple missions during a single flight, also requires larger airspace volume. Although the overall number of aircraft is likely to fall, and the number of flight hours is expected to remain stable, airspace demands will increase.

General aviation, such as recreational and flyover aviation and parachutists, will further squeeze the available airspace. The forecasted increase of civil and military airspace need will impact general aviation significantly. In attempting to overcome the strain on airspace, the needs of all users of the Dutch airspace must be considered.

[8] *IATA, 2006*

[9] *EUROCONTROL, 2006*

Airspace users demand increased flight efficiency and ATM consolidation in order to improve profitability

The extreme cyclicality of the airline industry combined with very high fixed costs explains why airlines are calling for increased flight efficiency and consolidation. Any improvement in these regards flows directly into the bottom-line of airline companies.

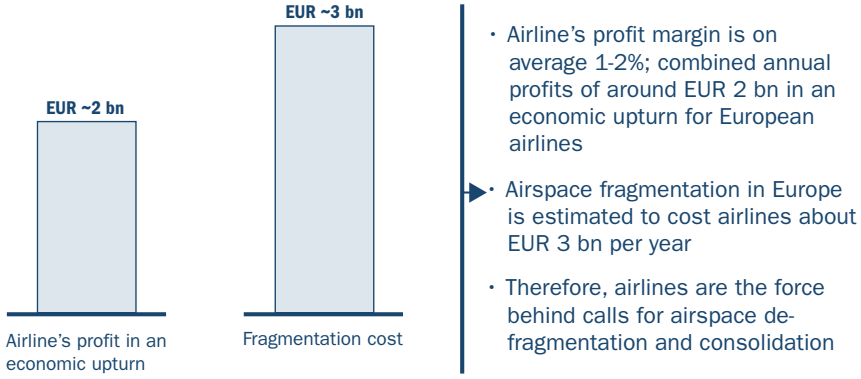


Figure 4: European airline profit in an economic upturn is less than the estimated cost of fragmentation in Europe (source: AEA, 2006)

Airspace fragmentation in Europe is estimated to cost airlines some EUR 3 bn per year[10]. Considering that the industry's profit margin is on average in the 1-2% range, with total annual profits of around EUR 2 bn in exceptionally good years for the European industry, airlines are the force behind calls for airspace de-fragmentation and consolidation. The creation of FAB Europe Central (Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland), for example, could generate annual user benefits of EUR 800 m to EUR 1 bn by 2020 through consolidation and better coordination. Furthermore, the operating results of the three largest European airlines would be improved by around 50% (using 2004 figures) as a result of fully optimized efficiency and consolidation.

Flight efficiency improvements are needed to control increasing fuel prices

Airspace users are very concerned about increasing fuel costs, which from 2001 to 2005 have grown 19% annually. Fuel cost is now the single largest external cost for European airlines, representing approximately 20% of their total operating costs in 2005 (see **Figure 5** below).

[10] *AEA, 2006*

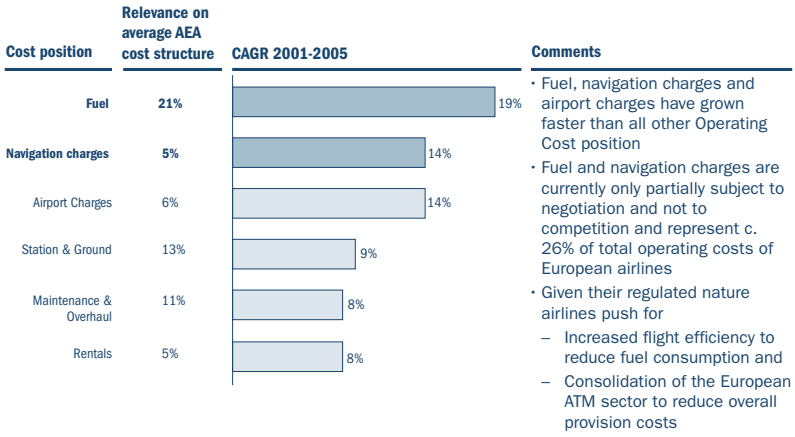


Figure 5: External costs CAGR, all AEA airlines, 2001-2005 (source: AEA)

Airspace users cannot impact fuel price development, as demand is far greater than supply and as fuel prices are highly regulated (e.g. OPEC). The only possibility users have is to control/reduce their fuel consumption. The reduction of flight inefficiency is seen by users as the best method for controlling/reducing fuel prices.

Flight inefficiency, defined as deviation from direct flight routes, is estimated at 5% (measured in flight hours) in a FAB Europe Central. Airspace users would benefit from more direct flying: variable flight costs (such as fuel) would be reduced and even fixed costs (such as number of aircraft) could partly be reduced. It is estimated that by 2020, airspace users could save some EUR 330-460 m per year (see **Figure 6**).

Airlines are pushing for ATM consolidation to reduce associated costs

National borders limit operation efficiency possibilities and therefore contribute to European ATM fragmentation. A FAB Europe Central can reduce the number of centers and, thanks to better benchmarking, improve those centers that remain. A cost reduction of approximately EUR 430-520 m on an annual basis is feasible by 2020.

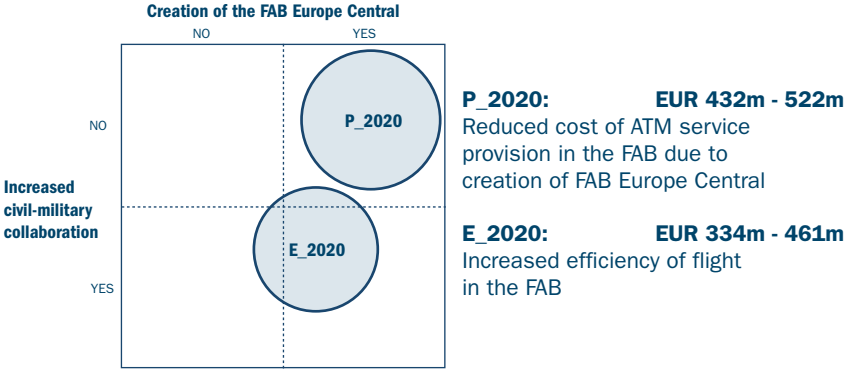


Figure 6: Breakdown of annual benefits of FAB Europe Central and civil-military collaboration

The current European charging system guarantees European civil ANSPs full recovery of costs they incur from providing air navigation services. The costs are charged to airspace users by allocating total ATM provision costs over the number of expected flights. In case traffic volumes stay below forecasted levels, unit rates are accordingly increased in later years, meaning that any volume risk is borne completely by airspace users. As a result, few incentives exist for ANSPs to work in a cost efficient way. This is demonstrated by the considerable increase in charges between 2001 and 2005 (see Figure 5). On average, European airlines were charged 14% more on an annual basis over this period[11].

[11] *Note: In some countries, ATM unit rates are still high in order to recuperate from the decrease in traffic after "9/11" and other events (e.g. SARS), which slightly overstates the indicated growth in overall ATM charges.*

B. The Dutch ATM system's current market structure and regulatory framework are insufficient to fulfill national growth needs, military training requirements and cannot take advantage of opportunities offered by SES

The Dutch ATM system should be proactive in seizing the opportunities of the future. In order to secure national growth needs and participate advantageously in SES, the ATM system should change

Today's Dutch ATM system might be sustainable in the short term, but cannot be sufficiently sustained in the future. It will most likely not support the expected and desired growth at Mainport Schiphol (a 3% increase in passengers by 2020), nor is it sustainable for the spirit or objectives of SES, which include:

- Enhance capacity by 2020 to enable up to a 3-fold increase of air traffic movements while reducing delays;
- Improve safety performance by a factor of 10;
- Enable a 10% reduction in the effects aircraft have on the environment;
- Provide ATM services at a minimum 50% cost reduction to airspace users.

For the military the current ATM system does barely support the actual training requirements. With the introduction of new fighters in the near future the current ATM system will not support the future training requirements sufficiently. A new system should provide for this need.

The Netherlands should take a proactive approach to these called-for developments. Choosing to wait for what comes could possibly lead to the loss of its solid position in the European aviation industry. A laissez-faire attitude will not enable the Netherlands to steer or control certain developments, and benefits that could have been gained will be beyond its grasp. Most likely the consequences of a laissez-faire approach will be irreversible.

B1. The Dutch ATM system is a complex "chessboard" of processes, airspaces, and national and international "rules of the game"

To assess the current and any future ATM system, a framework was created: "the ATM chessboard". The basic elements of the chessboard are defined along two axes:

1. Vertically, the layers of airspace that structure the ATM system
2. Horizontally, the fundamental functions that structure the ATM system

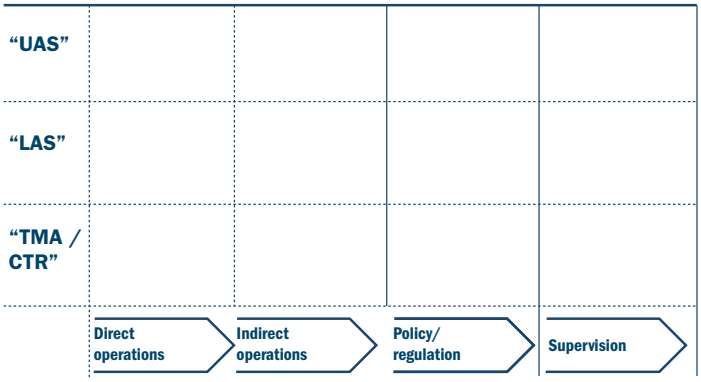


Figure 7: ATM chessboard and its two axes

The ATM chessboard allows for addressing both the differences and commonalities of each intersection of airspace and function while maintaining a clear overview. For each intersection, a concrete rationale is at hand to understand, design and decide upon what is required of the (future) ATM structure.

The airspaces structuring the ATM system

There are three airspaces that must be considered separately in order to understand the mechanism of an ATM system: "Upper Airspace", "Lower Airspace" and "TMA-CTR" (Terminal Maneuvering Area and Control Zone)[12]. This definition of airspaces refers to the different characteristics of the use - which can be summarized in "en-route", "climb and descend" and "terminal" respectively. The definition is not derived from the current flight levels and is independent from them: different countries will use slightly different flight levels to delimit one airspace from the other, the nature of these airspaces will however not change.

Each airspace and its use has different characteristics which require different business models and structuring principles. Understanding these characteristics, business models and structuring principles provides a solid base for designing any (future) structure of an ATM system – and is more important than a debate over the appropriateness of the different flight levels used in different countries.

The structure of Military airspace is also based on training variables such as formation size, type of exercise, height band requirements and meteorological conditions. Military training areas can extend across different types of airspace and might be used as both a TMA and a training area simultaneously. Whereas this specific requirement needs to be accommodated, it does not change the main structuring principles.

[12] *Other definitions of airspace exist, however taking the fundamental characteristics of the use of airspace lead to this division of airspace into three definitions, hence the terms are put between inverted comma's*

	Operations	Infrastructure	Regulatory	Financial
"UAS"	· En-route traffic (lateral, constant speed, similar types of A/C): Optimal sector design- large lateral area, few flight levels per sector · Less military activities[1] · "Strategic" ATC[2] · SESAR: Implementation of Freeflight · ATCO certificate: ACC rating endorsement required	· Less accuracy in systems (resolution & update time radars) required · Less sophisticated IT systems required · High economics of scale possible	· EU Commission fostering integration of UAS: Idea of "SES" builds primarily on UAS	· High revenues, low allocated cost · High economies of scale
	Operational interfaces (airspace design, procedures) depend on structure of UAS and LAS			
"LAS"	· Desc. / ascending traffic (varying speed & direction, diff. types of A/C): Optimal sector design - smaller lateral area, many flight levels · More military activity[1] · "Tactical" ATC[2] · SESAR: No impl. of Freeflight · ATCO certificate: APP rating endorsement required	· High accuracy (resolution & update time radars) required · Sophisticated IT systems required (able to handle complex traffic situations and fast situational changes) · Complexity of procedures limits economies of scale	· High Level Group discusses the integration of LAS	· Less revenues, high allocated cost · Limited economies of scale
	Operational interfaces (airspace design, procedures) depend on structure of LAS and TMA			
"TMA"	· Departing and arriving traffic · Optimal route design constrained bij local regulation · Frequent interaction between controller and ground staff (e.g. Meteo, emergency units)	· Specific landing/departure supporting infra & systems · High accuracy (resolution & update time radars) required · Sophisticated IT systems required	· Local rules and regulations applicable	· Separate charging (landing fee) · Efficient operation of TMA of high strategic importance for big national airports

1) E.g. approx. 50% of all mil. exercises in the NL require LAS; other 50% can either be in LAS or UAS
2) "Strategic" ATC - longer forecast of traffic, less dynamic, more collaborative actions by ATCOs; "Tactical" ATC - short term forecasting, very dynamic, more individual actions by ATCOs

Figure 8: The characteristics of the different layers of airspace

Upper Airspace

■ Characteristics

In Upper Airspace, most traffic is en-route traffic. En-route traffic adds little complexity to the ATM system, as it requires mostly the routing and de-routing of straight flight paths within a very large volume of airspace. Infrastructure and systems required to provide services in Upper Airspace are straightforward and need little specification to a certain geographical region[13]. The revenues made by the ANSPs in Upper Airspace are typically high and the allocated costs are potentially low.

■ Business model

Considering its characteristics, its business focuses on "optimization" through straightening horizontal flight patterns on a European scale. To provide for this optimization, the business model pushes for increased coordination between providers, thus driving scale and sheer size of the controlled area – the latter expressed in square rather than cubic kilometers.

■ Structuring principle

In order to comply with its business needs, the organizational structure must be based on full integration of operations, airspace design coordinated between different country and types of users (civil, military), and uniform ATM technology and systems – on a cross-border level, including as many countries as possible.

[13] *In the future, the complexity in Upper Airspace can increase due to a possible rise in general aviation (e.g. small business jets) and the introduction of free-flight. However, such developments are still hypothetical and their impact is unknown.*

Lower Airspace

■ **Characteristics**

In Lower Airspace, most traffic is descending and ascending traffic to and from an airport and airways. This kind of traffic generates a lot of complexity to the ATM system in a relatively small volume of airspace, which is further complicated by the presence of nearby, major airports in neighboring countries. Infrastructure and systems required to provide the services in Lower Airspace are sophisticated – able to handle complex traffic situations and rapid situational changes – and specific to a region and/or airport. The revenues in Lower Airspace are relatively low and the allocated costs are potentially high.

■ **Business model**

Considering its characteristics, its business focuses on "optimization" through a mastering of complexity. To provide for this optimization, the business model pushes for consolidation to increase operational efficiency – going through a maximization of the area (expressed this time in cubic kilometers) controlled from one hand. For the Netherlands, this applies to the Schiphol Approach Area[14], the area within a radius of 200km of the airport. Consolidation is effective and achievable mainly with neighboring countries.

■ **Structuring principle**

In order to comply with its business needs, the organizational structure must be based on increased cost efficiency (above and beyond national borders and across different types of users), maximal utilization of assets, and improved complexity management.

TMA-CTR

■ **Characteristics**

In TMA-CTR, most traffic is departing and arriving traffic to and from an airport. This kind of traffic generates a lot of complexity to the ATM system in a very small volume of airspace. Infrastructure and systems required to provide the services in TMA-CTR are very sophisticated – dedicated systems for take-off and landing – and specific to the airport. Revenues made by the ANSPs in TMA-CTR are determined and charged to the users via a separate system (from that of Upper and Lower Airspace), called "terminal charges".

■ **Business model**

Considering its characteristics, its business focuses on "optimization" tailor-made for local characteristics (hub-specific procedures, policies, regulations including environmental requirements). To provide for this optimization, the business model is strongly favored by operational integration (airline, airport, ATM).

[14] Also referred to as Area Control.

■ **Structuring principle**

In order to comply with its business needs, the organizational structure must be based on increased investments in operational efficiency while securing local interests. It must integrate policy on safety, environment and economy and push for innovative services, all under clearly defined operational guidelines.

Although the above differences in airspace should always be taken into account, it should also always be clear that the stated differences in airspace solely apply to the business model and structuring principles. The differences do not imply that each airspace requires different operational concepts, procedures, systems or certification. On the contrary, uniform airspace design including procedures, systems and certification is the linking pin of the ATM system. The chessboard approach supports the prevailing movement towards de-fragmentation of the ATM system, but also addresses the various approaches required to achieve full optimization.

The fundamental activities structuring the ATM system

There are three activities that must be considered in order to understand the total mechanism of an ATM system: Operations, Policy & Regulation and Supervision. A clear separation of the activities is important to maintain a solid balance within an ATM system, irregardless of who performs the different functions, following modern governance principles.

Direct operations	Indirect operations	Policy & Regulation	Supervision
Aerodrome Control	Airspace Design	Develop national and EU policy	Inspection / preservation of the factual state of affairs
Approach Control	Air Traffic Flow & Capacity development	Develop national & EU regulation & legislation	Permission / continuation (e.g. licensing)
Area Control	Air Traffic Service development	Translate / develop / apply international policy, regulation & legislation into national policy and law	Certification (e.g. ANSP)
Airspace Management	Systems & Infrastructure (incl. CNS[1])	Decision making (e.g. on tariffs) concerning governance	Enforcement of rules
Air Traffic Flow and Capacity Management	Aeronautical Information Mgmt.	Sovereignty tasks (e.g. airspace security, take-over in crisis situation)	Report the results of inspection
Flight Information Service	Performance Management (e.g. Incident Analyses)	Test new policy and intended law and rules	Develop lower regulation
Alerting Services	Research & Development	Advise government, companies and citizens	
Security Tasks	Recruitment		
	Training		
	Simulation & testing		
	Collecting charges		
	Meteorological information		

1) CNS = Communication, Navigation & Surveillance

Figure 9: Activities of the ATM system

Operations

Within Operations, a distinction can be made between direct and indirect operations. Direct operations concern those functions dealing with daily operations directly linked to handling air traffic. Indirect operations concern those functions that support and/or evaluate direct operations.

Policy & Regulation
Policy must set the framework that organizes, maintains and develops airspace management to secure the safe, smooth and orderly movement of air traffic. It concerns functions dealing with the development of national and EU policy, legislation and regulation, and the translation and application of ICAO and other EU laws and agreements into national law. Sovereignty tasks (e.g. security, military control in a crisis situation) are also part of Policy & Regulation.

Supervision
In order to secure consistency and continuation of the safe, smooth and orderly movement of air traffic, Supervision must perform functions related to certification (e.g. ANSPs, airports, systems and infrastructure), ongoing oversight (inspection, preservation) and applying but also testing new policy and intended law and rules.

The Operations functions are the main design parameter for an ATM system. When designing the Dutch ATM system, the Operations functions should be outlined first, as the Policy & Regulation and Supervision functions will follow accordingly. The chosen structure of Operations functions will indicate the structures of the rest.

B2. Matching the chessboard approach with certain preconditions and scenarios shows in what ways the current Dutch ATM system is not capable of meeting growth demands or the trajectory of SES nor meet the military requirements

In order to asses the current ATM system and identify the need for any new structure, the current situation was placed on the chessboard and evaluated against 13 preconditions and four future scenarios.

Key preconditions should be met to the highest degree possible within the current or any future ATM system
In order to evaluate the current and any future ATM system, 13 preconditions were identified and agreed upon by all stakeholders. The preconditions address regulatory, political, economical, industrial and managerial topics.

	Precondition	Evaluation criteria - Can the option in scenario comply with:
Regulatory	1. Sovereignty clause	Intervention by the military in crisis situation and military ability to fulfill safety mission
	2. SES implementation	Not only with law and related directives but also with spirit of SES framework
	3. Schiphol Law	The set directions: Schiphol must grow while securing low noise and pollution nuisance
	4. Civ-mil cooperation	Secure and ensure futher collaboration of civil-military
Political	5. Vested interest	No vested interest of any shareholder can be allowed at the expense of Schiphol
	6. Transparent comm.	Transparent communication with neighboring areas and other relevant stakeholders
Economical	7. MS accessibility	Secure efficient use of available capacity (ground and air) and competitiveness of costs
	8. Clear added value	Provision for a added value must be clear (e.g. cost efficiency)
	9. Secure local interest	Local Schiphol users have an optimal local system securing their interests
Industrial	10.One Bottom-line	What goes into a FAB (e.g. routing, charging schemes, ...) goes into one bottom-line
	11.Unbundled functions	To ability to unbundle ATM functions
Managerial	12.Clear separation	Clear separation and transparency between governmental and private tasks
	13.Org. flexibility	Org. ability to act rapidly on developments outside the immediate scope of influence

Figure 10: The 13 preconditions put forward by all stakeholders

Evaluation against these preconditions assesses the degree to which an ATM system can comply with each individual precondition.

Evaluation of the system in light of the preconditions and future developments reveals that the current ATM system is inadequate

On two “key” preconditions, the current ATM system cannot comply to the highest degree possible:

- Mainport Schiphol accessibility
  In order to secure optimal Mainport Schiphol accessibility, it is especially important to work towards the desired optimizations in Lower Airspace and TMA-CTR. This concerns the “Schiphol Approach Area”, an area within a radius of 200km of Schiphol. Optimization will be ensured through collaboration and alignment with neighboring countries on airspace design and the push for consolidation. This is not entirely possible with the current system. The system also does not encourage nor incentivize the optimization of TMA-CTR operations and costs.

- Spirit and trajectory of SES
  Other than its commitment to SES regulations, the Netherlands must also comply with the “spirit” of SES. This includes supporting the creation of a FAB and stimulating the consolidation of ATM provisions, and the reduction of ATM costs. The ATM system must be able to participate in cross-border collaboration (not only in Upper but also in Lower Airspace), push for consolidation, and separate its functions. In the current situation, there is no possibility to meet these requirements.

The main limiting factors of the current Dutch ATM system (civil and military together) are:

- The lack of absolute separation of regulation and operations;
- The current supervisor is too dependent on the ANSP(s);
- The multiple responsibilities of the ANSP(s) cloud focus on operational efficiency;
- The ANSP(s) are not able to participate in cross-border cooperation;
- The lack of incentive(s) for ANSP(s) to reduce their costs (those in line with optimization of the total Dutch ATM system);
- Fragmented responsibility for airspace design (civil and military) in the Netherlands.

The ATM system should be resilient to unexpected changes in future European ATM developments and/or to the influence of large international players

In order to make the evaluation of the current and any future ATM system and its sustainability complete, the system must be set against possible future developments. As the outcome of some major current developments are unknown – e.g. future action by the EC (top-down approach in 2008 on SES/FAB), internationalization strategies, and movements of major players such as DFS, NATS, DSNA, etc. – four possible future scenarios have been defined. These are in turn structured along two axes, which represent the possible evolution of the two key uncertainties (SES implementation and airline strategy):

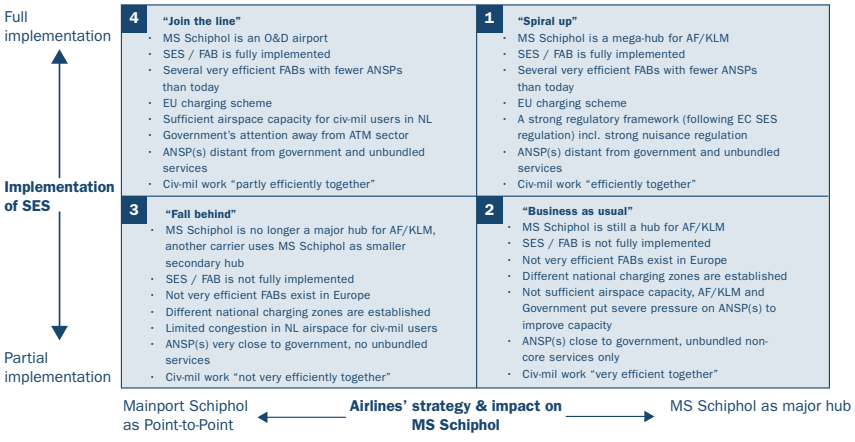


Figure 11: The four scenarios

Within this framework, the outlined scenarios were completed and further detailed with remaining key uncertainties, trends and all other relevant background information. Evaluation of the system against these scenarios assesses its ability to cope with (any) future European ATM developments and the influence of large international players.

This evaluation allows to conclude that the Dutch ATM system lacks sufficient flexibility and is not robust enough to ensure a sustainable situation in the future.

Other countries have already started addressing critical issues within their ATM systems, including the clear separation of regulation and operation

In the UK, the government privatized the ANSP (NATS) and clearly separated supervision and operations. NATS is prepared to further expand its activities abroad. The installed Civil Aviation Authority (CAA) will secure the economic and operational performance of NATS. Due to the CAA's expertise and independence from the government, it can exert significant influence. Although the system is not perfect, the UK structure is prepared for future European developments and has the organizational flexibility to proceed. In Germany, many discussions concerning the separation of the ANSP (DFS) from government have already taken place. Although not yet approved, significant expertise has been garnered to make a swift transformation possible. Clear separation of the operations and regulation allows a company to work across national borders.

The Netherlands' ATM system is also ready for the next step

The Netherlands have successfully modified its ATM system whenever external developments required it to do so. In 1992, there was a push for Air Traffic Control (at that time, the LVB[15]) to be separated from the government in order to increase efficiency and accommodate further growth. Compelling the system to work in a more business-like context – gave it incentive to meet these demands. In 1998, the changed ATM system was evaluated. It was concluded that the 1992 requests were not sufficiently met; the incentives to change were deemed insufficient.

RNLAF and KNMI already collaborate extensively, operationally and technically. The meteo infrastructure in future will be mainly KNMI owned and exploited, with the Netherlands defense organization as customer. The RNLAF is at present studying further co-operation with the KNMI, where KNMI would concentrate on standard aviation meteo and the RNLAF would focus on operational meteorology, including a deployable capacity. By maintaining two meteo offices KNMI and RNLAF can act as mutual contingency. The same as for deployable ATM (in crisis area's), deployable meteo functions will be manned with military personnel only

The Netherlands is again at a crossroads. It should change its ATM system to prepare for impending developments and to secure national interests. It is time for the Netherlands to move forward.

[15] *Luchtverkeersbeveiliging*

C. Acceleration of European cooperation and introduction of market mechanisms are in the Netherlands' best interest

C1. A rejuvenated Dutch ATM system will satisfy the preconditions and provide the structural foundation that can handle SES and other European developments

It is clear from the "chessboard" that each of its "squares" corresponds to a single and uniform governing principle in order to secure a strong position in the European ATM landscape. Two distinct necessary changes to the Dutch ATM system emerge:

- Introduce a management contract mechanism that will focus ANSPs on operational efficiency and specialization, positioning them at the fore of the rationalization arena
- Put in place a strong ATM-regulator, the Dutch Aviation Authority on ATM (DAA-ATM), that is clearly separated from operations and can, amongst other functions, steer and supervise the management contract mechanism

A management contract mechanism will focus ANSPs on operational efficiency and specialization, positioning them at the fore of the rationalization arena

A management contract ("beheerscontract") principle will govern operations by encouraging ANSPs to provide cost-efficient ATM services that are safe and adhere to environmental regulations. A management contract is defined through:

- The definition of clear objectives
- A clear and finite timeline of the contract
- The identification of KPIs to measure and monitor process and performance
- A mechanism for periodical review of performance

Allowing the operator to choose and use regular management instruments and tools to achieve the objectives set.

A management contract will situate ANSPs in a business environment where innovation is required for (agreed upon) cost-reductions and performance enhancement (which were concluded as crucial by the 1998 evaluation of the 1992 Air Traffic Law, leading to the founding of LVNL as a ZBO), and where cooperation is encouraged. The terminating option of the contract introduces the essence of a market regime and gives an ANSP the freedom and distance from the government to actively pursue improvements while allowing the government to steer progress and sanction or reward the provider for services delivered.

Introducing management contracts is also a means to compel the government to actively think about enhancement objectives for the respective airspaces. Through a management contract, the government specifies what is expected of operators, which objectives need to be achieved, and which indicators will be used to measure performance. Operators in turn focus on these objectives, and are able to

evaluate whether their mandate is sufficient. This creates a balanced and focused system of singular responsibilities under a market regime suited for the purpose.

Such indicators in a management contract scheme will not only allow for the transparency to benchmark between providers, but also enable a fundamental change of the system. It will push service providers to cooperate internationally and rationalize their operations – potentially through the reduction of centers – in order to continue to measure up to market demands.

This management contract is not to be understood as a concession in its "classic" sense. For example, granted LAS management contracts are unlikely to be returned unaltered at the end of their terms. Cooperation with neighboring states will irreversibly reshape the object of the management contract. With a management contract, an ANSP can choose and develop optimal co-operation form and contracts, such as joint-ventures, mergers or milder forms of participation. Its form and shape will alter over management contract generations, as experience will be gained and mutual trust established.

A management contract for TMA-CTR and LAS should be administered separately, as each airspace may well have its own set of objectives. TMA-CTR management contracts will be driven more by noise and emission reduction and will have a regional character.

LAS management contracts will focus on accelerated innovation to safeguard accessibility and continuously enhance the management of complexity. This requires by necessity a more international focus – and it could well lead to a de facto integration of the provision with neighboring countries, thus realizing one of the key principles of the SES regulation.

A management contract can also be introduced in UAS, whilst fully respecting the principle that the State Governments grant such management contracts to the providing entity. Additionally, it must be stressed again how the main efficiency driver in Upper Airspace is size and coordination, and, for the moment, this is best served by the coordination of as many as possible State Governments, without being forced to follow the individual governance systems of any relevant ANSPs.

A management contract could in theory also be applied to military CTR and TMA operations, even taking specific (national) tasks into account. However, in case of military crisis operations abroad, these ATM functions might be needed outside of the Netherlands. In such a situation, material and personnel can be deployed on very short notice, possibly to austere locations where they would operate under hazardous conditions. This personnel must be familiar with all forms of military air operations and ATM in a tactical environment. Realistically, this means that – under current national law – only dedicated military personnel can fulfill these duties. This makes a management contract system for military CTR and TMA in the short term impractical.

Given the benefits of such a system, however it is important that in the long term, civil providers and military providers meet the same conditions; the same organizational structure (separation of policy, regulation and supervision from operation) and the same procedures and certifications as these will enable the introduction of comparable mechanisms.

Since it will be the Dutch State which distributes management contracts for the relevant airspaces, the management contracts can and should be devised to allow maximum coordination between airspaces – horizontally as well as vertically. Giving out different management contracts does not automatically imply different ANSPs nor a further fragmentation of the airspace, in fact it should improve the coordination between airspaces as each airspace is now guided by its true principles. And if neighboring countries do not introduce similar schemes, the government will maintain control through the designation of contractors.

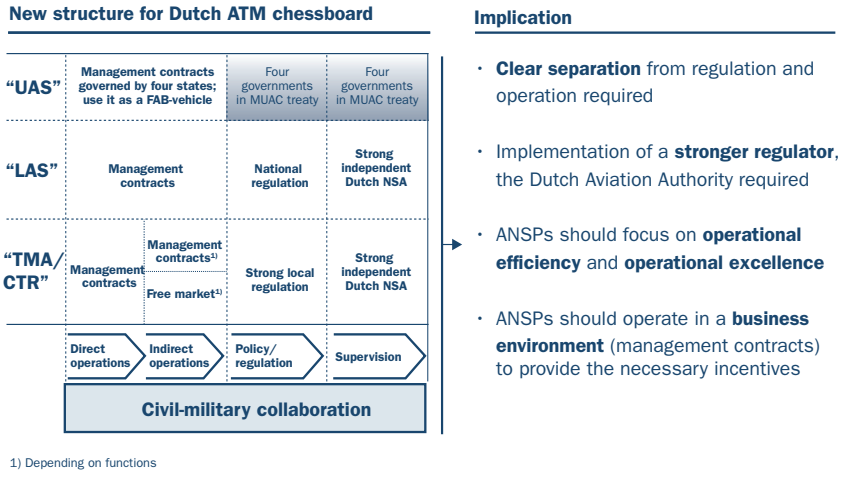
These aspects, and in a broader sense the complete design of the management contract scheme, require a strong governmental entity in the driving seat.

A strong regulator, the Dutch Aviation Authority on ATM (DAA-ATM), will steer and supervise the management contract mechanism

A strong regulator is required to optimize the management contract mechanism, steering operators and providing the necessary incentives. Establishment of the Dutch Aviation Authority (DAA-ATM) will create a knowledgeable regulatory body which can navigate a politically complex and multidisciplinary landscape. The ability to design and develop a productive management contract requires both a deep understanding of policies in the fields of transport, defense and where necessary environment, and the ability to translate these into clear operational requirements. The DAA-ATM will also be able to measure operator performance and steer it when required.

With the DAA-ATM, the Netherlands will have an advantage in the European ATM landscape, as the DAA-ATM can act as a general “expert” while simultaneously representing Dutch interests. The DAA-ATM should also build links to the Eurocontrol and EASA to ensure such close and discerning interactions.

While it is top priority to establish the DAA-ATM and position its regulatory responsibilities, it is possible that as European-wide bodies gain authority, the DAA-ATM will decrease in scope or sphere of influence. However – even in this long-term perspective – establishment of the DAA-ATM as an intermediate step is necessary to represent the interests of the Netherlands in the coming years. National and international/European supervision developments can evolve in parallel as long as the latter is always considered, to ensure a swift transformation when the time is ready to move to a European aviation authority. In any case, before national responsibilities can be delegated to European level it is first necessary to have a stable position in the Netherlands.



1) Depending on functions

Figure 12: The structure of the new Dutch ATM system, its regimes and implications

C2. The Ministries of Transport and Defence should accelerate to achieve the required national and international cooperation

The following recommendations are all in harmony with the latest European developments such as the current FAB discussions, however they are independent from them and must be considered as "stand alone" recommendations.

It is in the best interest of the Netherlands to accelerate the FAB integration
Integration of the airspace above and around the Netherlands is in the best interest of the Dutch community. For such integration to succeed, it must follow functional air traffic flow principles rather than national borders, and it must reflect the different business and functional characteristics of the various layers of airspace.

In the design of the future solution, the highest priority must be given to the point of view of the users, thus safeguarding the interests and welfare of the entire Dutch community. This will call for significant change in current structures, which are not organized according to this principle.

The airspace above the Netherlands is horizontally too small to ensure optimum access to Mainport Schiphol, efficient flight paths going to and from it. A radius of about 200 kilometers is required to meet such structural enhancements. The geographical limitations of the Dutch airspace also prevent the creation of larger military training areas over land. The solution can only be found in integrating Dutch airspace with the airspace of its neighbors – and that seeks to grow this as developments continue. Collaboration with neighboring countries is therefore not just desired but a true must. Certainly, LAS and UAS objectives should be

considered as integration moves forward. For a schematic illustration of airspace increase, please refer to Figure 13.

AF/KLM and the RNLAF will significantly and directly benefit from integration on a FAB Europe Central scale, while the Netherlands will benefit from accelerated integration indirectly.

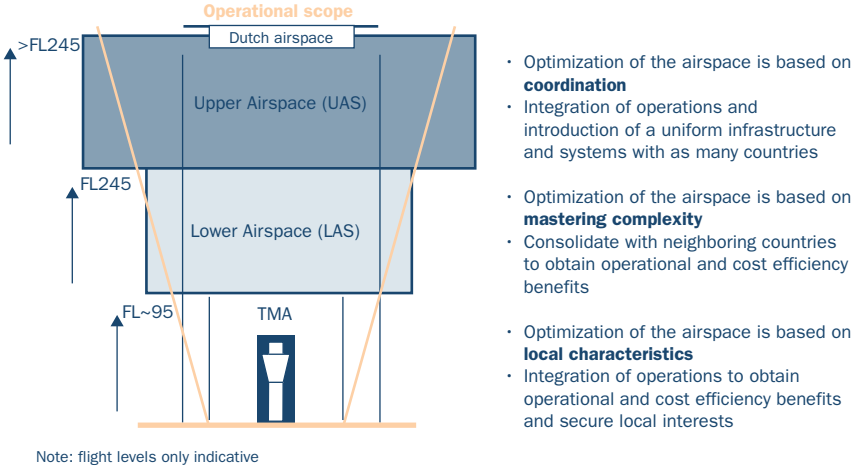


Figure 13: Dutch airspace requirements

In UAS, expand MUAC by including other ANSPs/countries. This will accelerate the increase of scale that will design and manage the UAS and will offer greater advantage

The traffic characteristics of Upper Airspace – dense, continuous flows of horizontal traffic, economies of scale function of the controlled square rather than cubic kilometers – are matched by the characteristics of MUAC. MUAC controls an area larger than those of individual Member States and serves traffic flows independently of State boundaries. It is in the interest of all Member States, and the Netherlands first among them, to accelerate the process of integration between adjacent areas of UAS, with MUAC at the center of this advancement to prevent re-fragmentation or reassignment of UAS blocks to the individual States. An initial step in the short term could be, for example, the extension of MUAC to the entire German UAS. The interest of the Netherlands is best served as long as the integrated area controlled by MUAC includes a sufficient amount of airspace around Schiphol, thus enabling optimal accessibility to the airport from all directions. This point should be kept in the foreground in case of negotiations on possible privileged axes of integration.

The current governance of MUAC, however, does not allow for growth and integration. The reporting line to EUROCONTROL and the subsequent positioning of MUAC as “out of reach” for the individual States make it difficult for MUAC

to play its natural aggregation role towards bigger controlled UAS areas. It is also not clear how EUROCONTROL can successfully continue in its current dual-role as provider (through MUAC) and regulatory body without falling foul of the SES principle of separation between these functions. For these reasons, it is recommended that MUAC separates from EUROCONTROL in its governance and reporting lines, maintaining it as a solely functional unit. In the long term, MUAC should become an(other) ANSP, driven by performance targets, measured along the level and quality of service delivered to the users and the efficiencies and costs generated. The management contract scheme recommended for the Netherlands should also be applied to MUAC, and controlled and granted by a multi-State entity.

Another crucial future step for MUAC is the combination of civil and military services for the relevant States, as already seen in its work for the German Air Force. This should be achieved through co-location of civil and military controllers, without excluding a long term solution that would include integration of the two service provisions. The MAA and the RNLAF have indicated this as a favorable option and are at present completing a feasibility study on co-location with the nations concerned.

Given MUAC's critical current and future roles and the disparities between governance structures of those ANSPs directly affected by MUAC (LVNL, DFS, Belgocontrol), we do not recommend at this point that MUAC report to a Joint Undertaking of the ANSPs, as this would stifle the development of the different ANSPs and slow down the enhancement of the service orientation.

It is recommended to create an intermediate state-controlled vehicle to which MUAC reports This body should also be the authority behind expansion of the controlled UAS to other neighboring countries (e.g. the UK). Once the position of the relevant ANSPs and States become more transparent and more aligned, the area controlled by MUAC should be subject to the same process envisaged for all airspace: efficiency increases through management contract mechanisms.

In LAS, push for consolidation with neighboring ANSPs (with a radius of 200km) in order to place Mainport Schiphol in the best possible competitive position

The traffic characteristics of LAS are completely different from those of UAS: here the service provision is much more complex, as traffic leaves the continuous flows of UAS and descends towards airports. The economies of scale are here driven by cubic rather than square kilometers, and the system is significantly more complex.

Crucial for LAS users is that the geometry of the flight paths is not negatively affected by external factors (national borders, no-go zones, interfaces and handovers between providers) but is allowed to follow principles of efficiency and

economy in the usage of the airspace resource. For example, the possibility of implementing Continuous Descent Approaches – or even gate-to-gate concepts – and to realize the associated fuel savings are intrinsically linked with an organization of airspace that is independent of local constraints. Also, the fragmentation of LAS is reflected in the number of centers active at the same time – a number that is only understandable for an airspace organized along national borders. Inefficient airspace usage and unnecessary costs are incurred as a result of this multitude.

Ensuring accessibility to Mainport Schiphol will simultaneously ensure a) the economic provision of service in the LAS above Mainport Schiphol and b) the horizontal extension and integration of that LAS to the highest possible degree. In order to achieve these goals, a mechanism must be designed that makes it attractive for the ANSPs to cooperate, integrate and thus realize economies of scale – not only through the harmonization of airspace design, but also through structural changes like, for example, a reduction in the number of centers.

The mechanism we recommend is the institution of tender processes for access to the provision of a service for a specified number of years. The process should be driven by the government and structured in the form of a tender for a management contract, where priority is given to the party that can provide a service that, within the set levels of quality, safety and technological standards, delivers at the lowest cost for the user community. This mechanism would evaluate participants based on business plans and on the levers that will be used to reduce costs, rewarding those proposals that could ensure a structural increase of efficiency.

The final situation may involve open tendering, inviting suitable ANSP's to offer their services. This also driven by reciprocity in other markets. Initially a management contract with the current provider seems most suitable. For some specific supporting functions tendering will be appropriate at an earlier stage.

A consortium that could bring together, for example, the current Dutch ANSP, LVNL, and one of the neighboring ANSPs (DFS, NATS, Belgocontrol) with a business plan based on the joint provision of services would have a good chance of winning a tender. Selection criteria necessarily considers a variety of issues, over and above financial returns for the State. For example, a demonstrated ability to deal with a co-located military organization would give a particular ANSP or cooperation of ANSPs advantage over those which cannot demonstrate this ability.

It is very possible that the choice of provider will lead to irreversible structural changes in the logic and infrastructure of the service provision, and for this reason it is not possible to refer to a "classic" process of tender for concessions, but rather a periodic designation process, in the form of a management contract, that at the same time commits to lower costs.

In TMA-CTR, minimize environmental burden while improving safety and maintaining strategic control

The traffic characteristics of the TMA-CTR are different from those of UAS or LAS: TMA-CTR is where the capacity burden is most felt by the entire user community and where inefficiency in one of the links of the aviation value chain reverberates throughout.

At the TMA-CTR level, it is possible to exert an immediate and significant impact on the environmental situation of the airport and its surroundings. The needs and development of the TMA-CTR are, however, often secondary to the smooth operation of Mainport Schiphol itself. A separate management contract will ensure the required local focus.

Although the grant of management contracts is mainly designed for the purpose of the Mainport Schiphol it can also be a suitable mechanism for the regional airports. However, as regional airports differ in characteristics it is important to make decisions on a case-by-case basis, leaving enough room to adjust and specify the management contracts accordingly. In this context, it should also be possible to grant the military a management contract, as long as the same rules and procedures apply to both civil and military providers.

The implementation of a stronger TMA-CTR system, and the guarantee of "protection" of local interests, would fall under the responsibility of a Dutch Aviation Authority, the remit of which would include ensuring that the overall gains in term of capacity, efficiency and costs delivered more than outweigh the disadvantages from possible dis-economies of scale.

A separate management contract could be given for the maintenance, management and support of ATM infrastructure. The provision as well as the operation of the infrastructure should be awarded for a limited time period to an independent provider that does not offer ATM services

The effectiveness of management contracts depends to a large degree on whether other providers will be able to offer ATM services in the Netherlands. Of critical importance would be that these providers have access to the data from the ATM infrastructure. Fair access can only be guaranteed if the infrastructure is separate from the operator. A separate management contract could be given out for the management of the ATM infrastructure. To avoid a conflict of interests, the provision as well as the operation of the infrastructure should be awarded for a limited time period to an independent provider. For clarity, it must be emphasized that ATM infrastructure refers to Communication, Navigation and Surveillance (CNS) infrastructure, not the ATM systems (e.g. AAA, simulators). ATM systems form an integral part of the ATM service provision and cannot be separated from the ANSP.

The length of the management contract period should reflect the requirements to invest and earn back the money invested in ATM infrastructure by any provider

and be therefore compatible with the depreciation period of such an investment. According to the identified preconditions, it is not necessary that the potential bidder is Dutch as long as it is guaranteed that the required ATM infrastructure (e.g. beacons) remain on Dutch soil. The obligations of any potential ATM infrastructure provider should be detailed (e.g. overall investment, return on investment). The State-awarded contract should remain flexible enough to adapt to "major technology" changes to ensure that the Netherlands is not isolating itself through technology but is rather embedded in European developments.

In some indirect functions, a free market regime can be introduced, such as for Meteo and the maintenance of systems and infrastructure
The dynamics of the provision of infrastructure (hardware, software) and its support and maintenance are different from those of other links in the value chain.

In order to reduce the costs passed on to the users, a rapid spin-off and re-tendering of these activities is recommended, with a process structured, coordinated and overseen by the DAA-ATM. Additionally, a number of services, currently in the portfolio of the ANSP, could be "commercialized" and exposed to market forces through outsourcing to an external supplier. Examples of this type range from the Meteo work (currently provided by the KNMI), to some CNS maintenance tasks, to the provision of Flight Information Services to the user community, and so on.

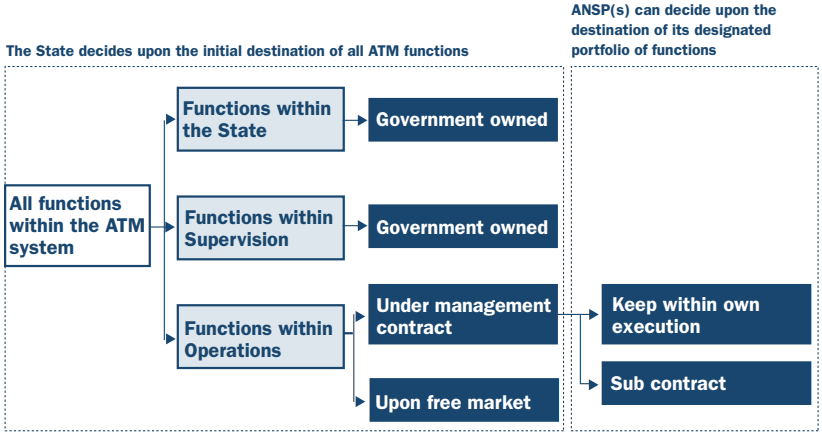


Figure 14: The State decides upon the initial destination of all ATM functions and the ANSP can decide upon the destination of its designated portfolio of functions

Integrate civil-military ATM to the fullest extent; on the national and European levels, integrate airspace design, infrastructure and systems, and supervision, and co-locate direct operations
Civil-military cooperation on both national and European levels offers such benefits that this cooperation should be pursued to its fullest extent, and only

where legal, economic, or national interests are in conflict should a co-location (rather than integration) be considered. Further civil-military collaboration will increase the efficiency and capacity of the airspace and will continue to satisfy the needs of both military and civil users.

Increased civil-military collaboration will on a national level result in some, albeit small, direct benefits for the Netherlands (~ EUR 22m p.a.). However, when the coordination between military and civil providers is optimized in an international environment, such as in the FAB Europe Central, substantial benefits can be unlocked for the users of the airspace (~ EUR 461m p.a.).

Current flight inefficiency in terms of deviations from direct routes in the core area of Europe can be directly addressed, as the current location of military training area's is one of the main restrictions. For example, via co-location of military and civil ATCO's the Flexible Use of Airspace (FUA) mechanism can be further optimized and serve as means to resolve these deviations. Furthermore, the possibility to use to the full extent cross-border training areas for military users reduces the complexity of today's national airspace design and the subsequent pressure on military and civil users. The most significant benefits as a result of civil-military co-operation are to be gained internationally.

Civil-military collaboration in the Netherlands

The implications of increased collaboration for the Dutch ATM chessboard are illustrated in Figure 15.

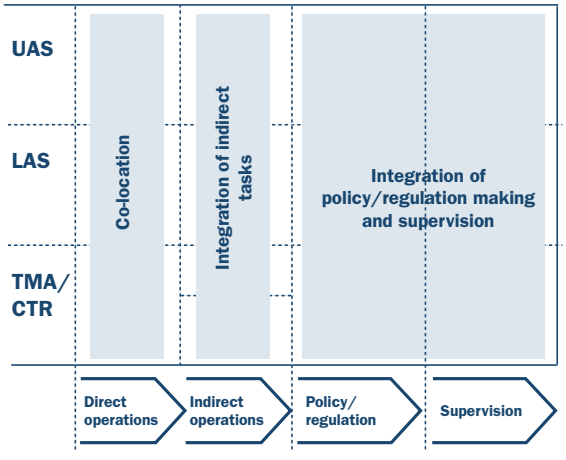


Figure 15: Civil-military collaboration on the Dutch ATM chessboard

- Co-location is required for direct operations. Full integration is not possible due to the foreseen introduction of management contracts in civil ATM provision and military operational requirements, such as posting of staff in conflict areas

- Full integration is required in several key indirect functions, such as systems, infrastructure (including contingency) and airspace design
- Full integration is required for policy, regulation and supervision

Co-location of direct operations:
The proposed management contract structure does not allow for full integration of direct operations, because service providers can change after a period of time or due to inadequate service levels. If the military would be fully integrated with the initial contractor, changing to a different provider might result in a complex and time-intensive restructuring. Depending on the management contract period and quality of service, this could be a relatively frequent and costly exercise and would go to the detriment of the potential benefits. The management contract scheme also intends to enable cross-border expansion of the providers. Full integration would put the military in a potential unsustainable or unacceptable situation, since Dutch military staff could not be controlled by a foreign company.

Apart from these concerns, the military has several specific requirements which cannot be fulfilled by full integration. For example, the posting of military ATM staff in conflict areas can be considered a core task of military ATM. This requires a certain amount of autonomous military ATC-capacity.

In the short term, co-location of direct operations is the maximum extent of collaboration possible:
- In Upper Airspace, the military should be involved as much as possible in the MUAC structure (co-location is favored by the MAA and RNLAF).
- In Lower Airspace, co-location should take place as to increase the efficiency and ensure best use of airspace.
- In the TMA-CTR separate or co-location regarding regional airports should be addressed on a case-by-case basis. These airports offer the military the opportunity to secure military operational effectiveness (required hours of ATC practice), but the economics should be carefully assessed.

Considering that infrastructure and systems in a management contract scheme would remain the property of the State, co-location allows for full harmonization of civil and military systems and infrastructure, yielding significant benefits. As a consequence similar systems will also enable each center to be the contingency[16] for the other and offers the possibility for continuous, 24/7[17] contingency. This reduces the need for separate civil contingencies and also ensures that a national center can always be maintained in a crisis situation.

[16] *Contingency requirements are driven by civil aviation*

[17] *24/7: 24 hours per day / 7 days per week, continuously*

It must be considered, however, that cultural differences between the military and civil staff as well as substantial differences in wages may be initial challenges to implementation. Furthermore, opportunities to restructure the providers and reduce personnel redundancies will be limited in co-location. These risks are not irreconcilable and are outweighed by the potential benefits.

Co-location of the civil air traffic flow management unit with military airspace planners is currently being developed in the AFMU concept. This will result in the continuously balancing between the airspace demand and airspace availability.

Specialization is an alternative in those cases where co-location is not specifically required. For example, if the Military decided to hand all of its Upper Airspace operations to MUAC, this is possible. As long as the grounds for and objectives of co-location are always taken into account and acted upon, the introduction of co-location does not exclude possibilities for specialization.

Full integration in several key indirect functions

In indirect functions, several key functions require full integration to maximize the potential benefits. These functions concern Design of Airspace and Procedures and Systems and Infrastructure.

Airspace Design should be fully integrated to allow for the satisfaction of the needs of both civil and military users. Systems and Infrastructure should also be fully integrated to allow for substantial cost savings in purchasing, maintenance and training, and for the contingency scheme.

Integration of other indirect functions, such as HR or maintenance, should be assessed on a case-by-case basis, as it is possible that switching functions between civil and military controls will not be cost-effective.

Full integration is required for ATM policy, regulation and supervision

The foreseen inclusion of civil policy, regulation and supervision tasks in the Dutch Aviation Authority should include full integration of their military counterparts. This concerns the integration of DGTL and the policy/regulation-making part of MAA, as well as the IVW and the supervision part of MAA. The structure of the DAA-ATM will encompass any specific military or civil functions concerning policy, regulation or supervision.

Such integration is required for the development of common policy and for having a harmonized approach to the contractors and MUAC. It will also give the Netherlands a single voice in its dealings with cross-border initiatives. The concept of the DAA-ATM is therefore recommended for the whole ATM industry. We recognize however that the military operate in a ‘total aviation concept’ while the civil side

is divided in separate pillars, where ATM operates along commercial entities like airlines and, to a different extent, airports. A validation of whether the concept of the DAA-ATM can be applied to this total aviation concept is recommended.

Civil-military collaboration in Europe
At the European level, civil-military collaboration should be as intensive as possible and involve as many nations as possible. This will allow for a uniform airspace design, unlocking substantial user benefits through increased flight efficiency. Close cooperation will aid the establishment of cross-border training areas and improve route design to and from Mainport Schiphol, thus improving accessibility.

Several countries already have quite extensive forms of national collaboration: providers in Switzerland are fully integrated and military and civil controllers in Germany are co-located. Though the organizations of these civil-military collaborations can differ, it is important that civil and military providers work closely together on an international level. If opportunities arise to integrate or co-locate certain functions across countries, these must be actively pursued.

Co-location of the Dutch military with MUAC provides for such an opportunity. The German military is already co-located at Maastricht, allowing for direct communication between the civil provider (MUAC) and the German and Dutch militaries.

Further separate ATM policy development from its execution by creating a Dutch Aviation Authority on ATM ("DAA-ATM") which integrates all relevant disciplines: defense, transport and environment
In order to conform to the European landscape and maximize all possible benefits from the Dutch chessboard, a strong Dutch Aviation Authority on ATM (DAA-ATM) should be created. This direction and ambition holds even if – as mentioned before – a thorough analysis is required to explore the implications and consequences of the set-up of the DAA-ATM on the aviation value chain.

In spite of the separation between DGTL, the Inspectorate (IVW) and LVNL (Operation, Policy and Regulation, and Supervision), the functions – in practice – are not clearly separated in the current Dutch set-up: similar functions are often performed by several players, leading to overlap and ambiguity. The DAA-ATM will solve these redundancies and enable the management contract mechanism, thus taking full advantage of the possibilities. The DAA-ATM will also be able to stimulate civil-military collaboration.

The union of DGTL, LVNL, MAA and IVW into the DAA-ATM is needed to resolve existing imbalances and to position the ATM system for the introduction of management contracts
In the government, policy-making and regulation tasks currently lie with DGTL and MAA. LVNL also has the legal task to advise the Minister of Transport

on policy-making and regulation. In practice, however, (civil) know-how and expertise are concentrated at LVNL.

Civil supervision functions are currently executed by both the IVW and the LVNL. There is a clear organizational separation between them, but in practice no real functional separation. For instance. the LVNL performs its own inspections and reports its results to the IVW, which in turn makes a final procedural check. In other situations the IVW is in the lead, but the LVNL currently holds a relatively strong influence on the outcome.

Military supervision functions are executed by the MAA. There is an organizations and functional separation between the MAA and the military ANSP.

Considering the governance structure of the current ATM system – all functions are within direct State influence – this imbalance and overlap of functions is of no immediate threat. However, the current situation may become a serious risk if the system moves towards a more market-driven regime. A strong DAA-ATM is the only way to create a balanced ATM system that profits from all possible benefits while securing national interests. Management contracts require strong regulation and clearly identified KPIs that are strictly monitored. The DAA-ATM must be a sustainable organization and posses all required knowledge and expertise to perform this supervision.

The DAA-ATM's should be able to ensure the independence necessary to further balance the ATM system. The government will hold final responsibility for policy and regulation (e.g. to secure the interests of the users). If the DAA-ATM and government are too close, one can override the other; advice from the DAA-ATM on regulation and policy could be "colored". The same holds for supervision functions. Parts of DGTL and MAA will therefore remain in the Ministry of Transport and Ministry of Defense respectively, to assess proposed regulation and policy from the DAA-ATM, to confer with other stakeholders if needed, and to prepare for the legislative process.

Finally, in order to create a strong DAA-ATM, it must be possible to attract specialists who might not necessarily want to be civil servants. Distance from the government could negate this issue.

The DAA-ATM must report to the Ministries of Transport and Defence while taking the Ministry of Environment into consideration where necessary

As mentioned above, the State, in the form of the responsible ministers, will hold final responsibility for ATM, as required by the ICAO.

To ensure that the benefits of the DAA-ATM are maximized, it is important to also include the Ministry of Environment in certain decisions with the Ministries of Transport and Defence as the bodies responsible. This will ensure attention to noise and emission issues and, also in a European context, ensure a smooth and

sustainable growth perspective for Mainport Schiphol. Although this could lead to a slower decision process, it will definitely secure swift implementation afterwards. Furthermore, the Netherlands will be a frontrunner in Europe, speaking with one voice from all three Ministries.

Install a consultation body to secure local stakeholder interests

To ensure that local stakeholders can address specific issues and topics, a consultation body should be installed within the DAA-ATM. The consultation body will consist of representatives from all local stakeholders who hold the right to advise with regard to certain interests. Such advice will not be binding, but as an initiative, the consultation body will directly encourage and support stakeholder interaction.

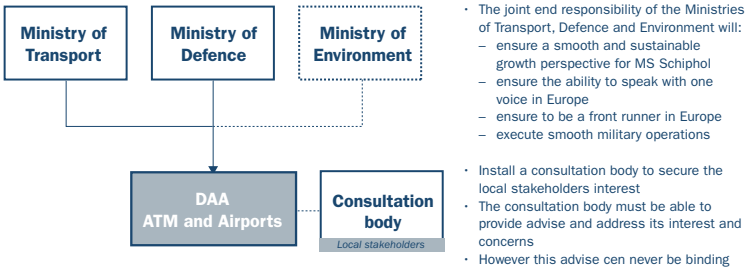


Figure 16: Ministries of Transport and Defence must hold final responsibility, with a consultation body that secures local interests

For the setup, a one-to-one transfer is possible – with room for efficiency gains

The size of the DAA-ATM should not be related to the size of the country, the home carrier or the ANSP. Its size must depend on the knowledge required to fulfill the ambition and requirements of the total ATM system. At first, a one-to-one replacement of employees from the current entities to the new structure is plausible. During the transformation process, there is likely room to remove duplications and redundancies and obtain efficiency gains.

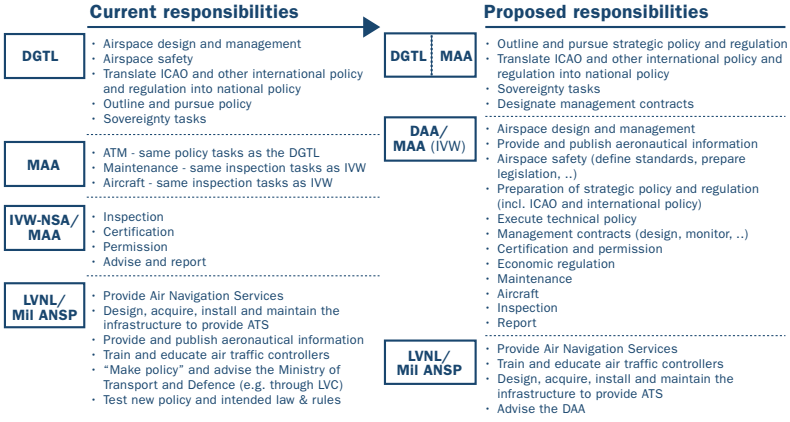


Figure 17:The transformation can be a one-to-one replacement with room to remove redundancies

Due to the scope in functions and expected benefits an analysis to explore the implications and consequences of the set-up of the DAA-ATM on the aviation value chain is required

Within the other parts of the aviation value chain there are overriding interests, resemblances and overlap in functions and governance issues. It could be necessary and required to apply the recommended DAA not only on the ATM system but on the whole aviation system (incl. airworthiness, airports and airline operations). It is recommended to be further investigated.

D. The implementation plan ensures the momentum of JAS 2020 and provides the required direction, deliverables and milestones

The overall outlines of this report have been discussed with and are generally supported by all stakeholders. The urgency to change is high and a solid, transparent and swift implementation of the recommendations is required. Due to the sensitive and complex environment – high safety and environmental requirements – the implementation of changes must be handled with the greatest care.

There are three types of implementation issues that need to be dealt with:
1. Individual responsibilities of each stakeholder
2. Strategic work streams; requiring a joint effort for a specific period of time and intensive cooperation of all stakeholders
3. Operational issues

Individual responsibility

The individual players are largely responsible for a smooth and solid implementation of the recommendations. It is important that each individual player distinctly investigates the implications of a change on its organization; e.g., how will the change effect its structure and governance, and what requirements are needed to keep a sustainable operation. Furthermore these implications and requirements need to be addressed and shared in the Steering group to establish not only a shared understanding but also to secure the necessary joint approach and implementation effort. For example:

- LVNL should prepare its organization in order to perform most efficiently and effectively in the context of an upcoming management contract. It will be necessary to write a (strategic) business plan detailing the transformation steps towards a more market-driven organization and outline a detailed description of the goals, targets and enabling factors needed in order to achieve operational excellence.

- The military should investigate the implications of the changes on its own organization, as also the possibilities disclosed. Further development of the increased cooperation, partial collocation and technical integration of its meteo functions with KNMI, co-location of UAS at MUAC and shared use of an MLAT system with LVNL should be realised. Technical integration with LVNL, e.g. a common display system, based on common software is key for future development, thus gaining economies of scale.

- The Ministries of Transport and Defence should perform the same analysis however on a larger scale. They should investigate the implications and requirements, induced by the various recommendations, concerning changes in governance, laws and policy principles.

Four strategic work streams

Four strategic works streams have been identified that cover the more extensive and complex recommendations of this report. These recommendations have set the direction to which the Netherlands must move forward to, however they require more detailed research than a pure "executive decision" on how, what and when to move forwarded in the stated direction. The work streams are as follows:

1a. Performance: Design of management contract scheme (incl. VEM, MUAC)
- Including a detailed outline of KPI's and other measurement models required, laws needed to be changed/adjusted, implementations steps

1b. Governance: Structure of aviation sector governance (i.e. DAA-ATM)
- Including a design for the startup version of the DAA-ATM, an outline of its target structure and governance, a transition plan for all functions, a recruitment plan and the implementation steps
- Investigate to which extent the DAA-ATM model is also applicable on the whole aviation system (including airports and airlines), define its target scope

2. Performance and governance of ATM on regional airports
- Including a detailed business case analyses on a case-by-case, an outline of the required governance and possible management contract scheme

3. Structuring and supporting the FAB discussion
- Including the alignment of all Dutch FAB discussions in the recommended direction, streamlining the international FAB discussion, investigate short- and long-term opportunities of redesign of LAS with neighbors and possible bi-lateral cooperations, also in the context of the run up to the introduction of management contracts

Although they are four separate work streams they must be executed simultaneously.

Operational matters

On several operational matters the Steering group must decide now on the desired direction and strategy for implementation. The main issues concerned are:
- Civil-military cooperation (incl. integration of airspace design, handover of Mil ATC UAS to MUAC, integration of systems and infrastructure and education and training, …)
- Co-location
- Contingency

These specific topics are independent from broader issues such as total aviation concepts, policy principles and the likes. Developing a business case and concrete implementation steps can be started immediately and decided upon in the short-term.

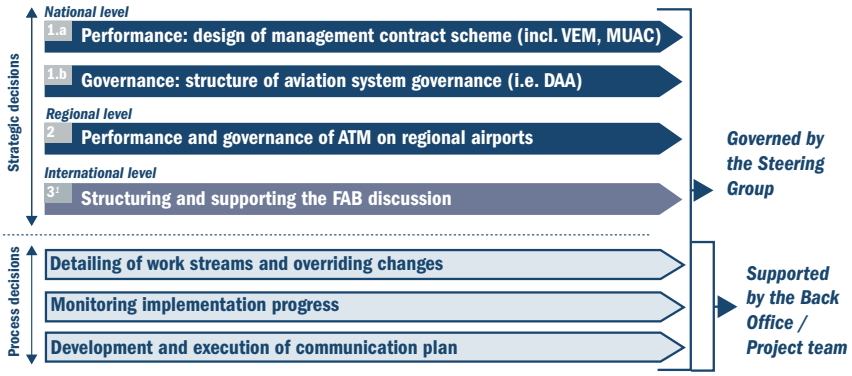


Figure 18: The implementation plan follows four strategic streams which must be executed simultaneously – governed by the Steering Group

Governance

The steering group of the JAS 2020 has proven to be a very effective and successful platform, resulting in endorsed recommendations. This platform will serve as the perfect coordinating forum to ensure a smooth and joint transformation. The steering group is a central point were all subjects and issues concerning the required changes can be addressed and analyzed, enhancing and stimulating the solution that serves the Netherlands best.
Overall consistency and acceptance are crucial for a successful implementation. To guarantee a smooth and swift implementation it is important to ensure consistency with developments and decision within the overall aviation system and create a broad and sustainable acceptance of all stakeholders involved. Aside from the Steering group, an empowered implementation project team can foster these requirements via structured and consequent project management and necessary communication. It is crucial that the implementation project team is installed as soon as possible to keep momentum.

E. Conclusions and recommendations

- The SES Regulations represent a unique opportunity for the development of Schiphol – and given the importance of Schiphol for the Netherlands, for the safeguard and development of the Dutch economy. As the Dutch State, together with all other EU States, has already committed itself to this regulation, the question is not "if" but "how" to implement it – and how to best take advantage of it.
- The Netherlands must regain in this respect a leading role in the European discussion and a proactive approach to the implementation of the changes implicit in the SES regulation. Doing nothing – or waiting for developments to come from the EU and adapting to them – is not an option.
- Today's Dutch structures are not in the position either to strongly support the growth of Schiphol by means of international co-operation, or to lead the SES implementation or the FAB discussion or to meet military requirements. If no change is made, the risk of marginalization – of Amsterdam in favor of Paris or of LVNL in favor of other EU ANSPs – is very concrete. Furthermore, the full use of future generation military aircrafts would be in jeopardy.
- Three key changes to the current Dutch setup are needed in the short term:

1. The introduction of management contracts for the provision of ATM services, with incentives to
   - Ensure a performance-oriented Government steering of the service provision
   - Realize a substantial capacity increase and cost reduction in the provision of service
   - Initiate a Dutch-led consolidation process of ATM provision, with the interests of Schiphol and of the Dutch economy at the top of the agenda

   The management contracts need to be different for the different layers of airspace – however, the same provider can be awarded more than one contract.

   - The contract for TMA-CTR needs to be structured on a case-by-case basis
   - The contract for LAS should have specific incentives for the consortium or JV of more ANSPs, in order to act as a platform for strong cross-border consolidation and integration. This also with the perspective to actively shape the FAB discussion
   - The UAS should see its scope expanded. It is necessary to take a leading role in this discussion to ensure that the expansion is centered on the Netherlands. The long-term objective should be the set up of a contract for the UAS as well
   - The management of the CNS infrastructure and data should be object of a separate contract, to enable the tender for LAS. This could be done initially by an independent provider

2. The introduction of a knowledgeable and strong Dutch Aviation Authority (DAA-ATM), reporting to the Ministries of Transport and Defense, clearly separated from operations, able to support definition and optimization of the contracts and the periodical review of the performance of the designated operator. The DAA-ATM should centralize the policy-making and regulatory tasks currently with DGTL and MAA and be able to rely on internal know-how in order to carry out its tasks and therefore be able to attract industry specialists. The DAA-ATM should also serve as a platform for the formulation of Dutch-relevant policies and positions before the discussion or the delegation of tasks at EU level. The analysis to explore the implications and consequences of the set-up of the DAA-ATM on the aviation value chain is required.

3. Civil and military co-operation should be pursued to the fullest extent, as it is crucial for the successful restructuring of the ATM system, at national and specifically EU level. The full integration of key indirect functions like airspace design, infrastructure and systems and of policy, regulation and supervision tasks is needed to disclose the benefits for the whole industry. In the short term co-location is recommended for direct functions. Both co-location and contingency planning, need to be finalized separately in their details.

   - An acceleration of the FAB integration should be actively pursued as the Netherlands will gain a disproportional share of its benefits. FAB integration is also completely in line with our recommendations: only the integration of the Dutch airspace with the neighbors' can secure the optimal access to Schiphol.

   - The implications for the current players are manifold:

     - LVNL's structure should be revised in order to allow it to
       - be able to compete for the management contracts (TMA-CTR, LAS)
       - un-bundle tasks to be centralized to the DAA-ATM (indirect, advisory and inspection tasks)
       - un-bundle tasks to be sourced in the open market (Meteo, maintenance and support of CNS or of some infrastructural hardware and software)

     - The MAA and the Mil ANSP should be able to centralize the necessary indirect tasks (airspace design, etc) with the civil ones in the DAA-ATM

     - MUAC's governance should be re-focused on the States directly affected by it

     The nature of the relation between IVW-NSA, MAA and DAA-ATM should be further detailed.

- The implementation must be handled carefully, due to the complex economic, regulatory and political environment, and with maximum urgency, given the head start gathered by other European countries and the foreseeable implementation time. A plan has been developed with the stakeholders, defining individual responsibilities, joint work streams and other operational issues.

Abbreviations

AEA	Association European Airlines
AF/KLM	Air France – Koninklijke Luchtvaart Maatschappij
AFMU	Airspace Flow Management Unit
AMS	Schiphol Amsterdam
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CNS	Communication, Navigation and Surveillance
CTR	Control Zone
DAA	Dutch Aviation Authority
DFS	Deutsche Flugsicherung
DGTL	Directoraat-generaal Transport en Luchtvaart
DSNA	Direction des Services de la Navigation Aérienne
EASA	European Aviation Safety Agency
EC	European Commission
EU	European Union
FAB	Functional Airspace Block
FUA	Flexible Use of Airspace
GACR	Compounded Annual Growth Rate
GDP	Gross Domestic Product
HR	Human Resource
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IVW	Inspectie Verkeer en Waterstaat
JAS	Joint ATM System
JV	Joint Venture
KNMI	Koninklijk Nederlands Meteorologisch Instituut
KPI	Key Performance Indicator
LAS	Lower Airspace
LVB	Luchtverkeersbeveiliging
LVNL	Luchtverkeersleiding Nederland
MAA	Military Aviation Authority
Mil ANSP	Military Air Navigation Service Provider
MUAC	Maastricht Upper Area Control Centre
NATS	National Air Traffic Services
NSA	National Supervisory Authority
OPEC	Organization of the Petroleum Exporting Countries
PAR	Paris, France Airport
RNLAF	Royal Netherlands Air Force
SES	Single European Sky
SESAR	Single European Sky ATM Research
TMA	Terminal Maneuvering Area

UAS	Upper Airspace
UK	United Kingdom
VEM	Veiligheid, Efficiëntie en Milieu
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer
ZBO	Zelfstandig bestuursorgaan