EUROCONTROL

member of FABEC

MAASTRICHT UPPER AREA CONTROL CENTRE

ANNUAL REPORT 2015

MAXIMISING ATM PERFORMANCE IN CHALLENGING TIMES

FAST FACTS

	2011	2012	2013	2014	2015	Trend 2014/2015
Safety indicators						
Category A and B infringements (caused by MUAC)	7	2	1	2	0	
Financial indicators						
Revenues distributed to States (€ M – €2015)	460.5	449.8	453.4	472.8	517.0	+9.3%
Total fixed-assets at year end (1) (Net book value) (€ M – €2015)	84.6	82.5	78.3	73.5	69.4	–5.6%
Capital expenditure at year end (€ M – €2015)	8	10.7	12.9	5.3	5.3	+1.0%
Total costs (€ M – €2015)	(6) 123.3	145.6	137.8	145.6	135.4	–7.0%
Staff costs	111.1	121.7	115.3	123.8	114.3	–7.7%
Non-staff operating costs	13.3	13.2	12.9	12	11.9	–0.5%
Depreciation	11.1	10	9.1	9.3	8.8	–5.5%
Cost of capital	1.3	0.7	0.6	0.5	0.4	–15.6%
Exceptional reduction	– 13.5					
Cost-efficiency indicators (2)						
Inflation rate (Netherlands)	+2.5%	+2.8%	+2.6%	+0.3%	+0.2%	
Total economic cost/flight-hour (€2015) (3)	254	271	260	296	323	+9.1%
Financial cost/flight-hour (€2015) (4)	243	260	240	248	225	–9.1%
MUAC-equivalent unit rate (€2015) (5)	22.4	24.0	21.8	22.5	20.4	–9.1%
Productivity (composite flight-hour per air traffic controller-hour on duty)	1.95	1.94	1.99	1.96	1.97	+0.4%
Movements	1,607,817	1,605,505	1,631,895	1,671,185	1,702,263	+1.9%
Flight hours	564,053	560,102	574,812	587,342	600,969	+2.3%
Service units	6,115,411	6,070,939	6,322,585	6,473,244	6,625,272	+2.3%
Punctuality (% of unimpeded flights)	99.8%	99.7%	99.5%	98.9%	97.7%	
Average delay/flight (minutes)	0.04	0.04	0.07	0.17	0.34	
Number of employees (31 December)	684	672	642	624	613	–1.8%

(1) **Total fixed assets** including work in progress.

(2) **Cost-efficiency indicators** are calculated on the basis of the cost-base.

(3) **Total economic cost per flight-hour**: key performance indicator used for ATM cost-effectiveness (ACE) benchmarking. It is the sum of ATM/CNS provision costs and ATFM delay costs per composite flight-hour. This indicator enables the trade-offs between cost and capacity performance to be measured.

(4) **Financial cost per flight-hour**: ATM/CNS service provision cost per composite flight-hour.

(5) The key performance indicator for cost effectiveness defined in the Single European Sky (SES) II Performance Regulation is the unit rate. Since the unit rate is calculated on the basis of consolidated costs and production at national level, the concept of a **MUAC-equivalent unit rate** has been introduced as a performance indicator. This indicator takes into account the specific MUAC costs and production. "Equivalent" indicates that the calculation does not take the full cost of MUAC service provision into account; EUROCONTROL support costs and the cost of using CNS infrastructure, which is made available free of charge by the Four States, are not included.

(6) This figure takes into account the exceptional reduction due to the implementation of accrual accounting and revalorisation of fixed assets on 2011 costs.

CONTENTS

MUAC PROFILE

The Maastricht Upper Area Control Centre (MUAC) is an international non-profit air navigation service provider, operated by EUROCONTROL on behalf of four States – Belgium, Germany, Luxembourg and the Netherlands.
MUAC ensures that aircraft flying in the upper airspace (above 24,500 feet or 7.5 km) over Benelux and north-west Germany can do so safely and efficiently.
To manage this busy and complex airspace, MUAC is organised on a multinational, cross-border basis. It is a working example of how European cooperation, both at civil and military level, can result in safety, capacity and efficiency benefits for all.
MUAC is uniquely positioned to provide sustainable air navigation services in a large airspace block, satisfying customer expectations and increasing air traffic demand.

Consolidating airspace across national borders

For more than 40 years, MUAC has played a pivotal role in integrating European airspace on a functional basis, driven not by national boundaries, but by the operational requirements of international traffic flows.

Thanks to its provision of seamless air navigation services to the upper airspace (above 24,500 feet) of Belgium, north-west Germany, Luxembourg and the Netherlands, MUAC enjoys a leading position in the core area of Europe. In order to maintain this position, it continuously strives to deliver safe, efficient, cost-effective and impartial cross-border air navigation services in a dynamic air transport marketplace.

By co-locating a Deutsche Flugsicherung (DFS) unit (Lippe Radar) which controls military operations over north-west Germany on MUAC's premises, the States have ensured high levels of cooperation and coordination between civil and military air traffic control.

To further improve safety and efficiency, the MUAC Air Traffic Control system has been deployed across different Royal Netherlands Air Force sites. The Shared ATS System (SAS) aims to ensure that all parties have a clear and up-to-date picture of the air situation in the Netherlands, and that synergies are exploited to the maximum extent to improve safety and efficiency. Furthermore, since May 2015, military traffic above 24,500 feet in the Amsterdam FIR is handled on a 24/7 basis by MUAC as General Air Traffic.

MUAC also provides correlated flight data to Belgium's Belga Radar Air Traffic Control Centre at Semmerzake.

One of MUAC's flagship activities is the development and implementation of leading-edge infrastructure and technology solutions to ensure that customers and stakeholders benefit from the highest levels of performance. MUAC's active involvement in SESAR (Single European Sky ATM Research) is instrumental in meeting this objective.

Mission and vision

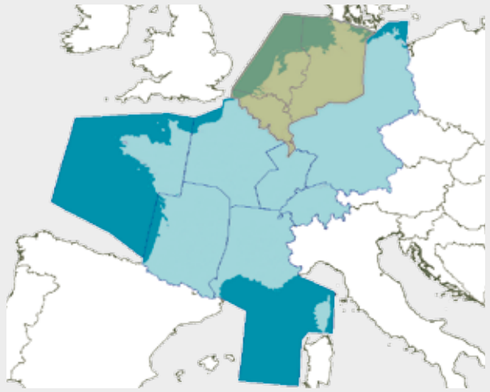
MUAC's mission is to provide cross-border Air Traffic Management (ATM) to civil and military airspace users, and to develop, integrate and provide state-of-the-art systems and services. Its priority is to offer customer-oriented, innovative and tailored services based on safety, quality and cost efficiency, and its challenge is to explore partnerships which support a diversification of advanced systems and services. The engagement and passion for performance of its staff are its strengths.

MUAC's vision is to be recognised as an outstanding ATM service provider and to drive the future of European ATM.

Over 17% of all European flights use MUAC's airspace.

Geographical scope

The area of responsibility of MUAC in Belgium, Germany, Luxembourg and the Netherlands consists of the Brussels UIR (Upper Information Region), the Amsterdam FIR (Flight Information Region) and the Hannover UIR from flight level 245 to flight level 660.



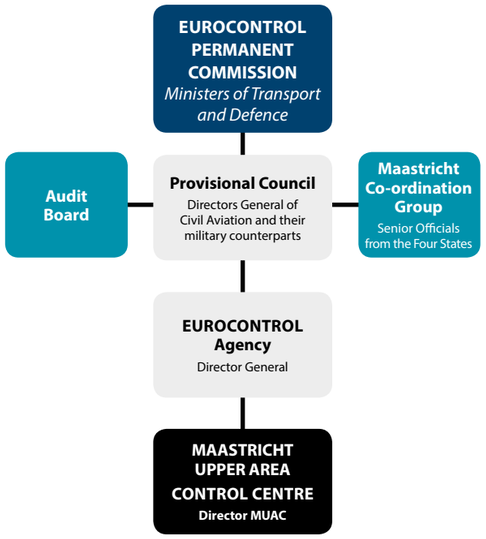
The MUAC area of responsibility is a complex and dense airspace in the close vicinity of major airports, including Amsterdam, Brussels, Copenhagen, Düsseldorf, Frankfurt, London and Paris. MUAC interfaces with a large number of civil and military area control centres and upper area control centres.

Corporate governance

MUAC is operated by EUROCONTROL on behalf of Belgium, Germany, Luxembourg and the Netherlands on the basis of the Agreement relating to the Provision and Operation of Air Traffic Services and Facilities by EUROCONTROL at the Maastricht Upper Area Control Centre (the "Maastricht Agreement"), signed on 25 November 1986. EUROCONTROL is an international organisation established under the EUROCONTROL Convention of 13 December 1960, subsequently amended on 12 February 1981.

In line with Article 15 of the EUROCONTROL Amended Convention, air traffic services at MUAC are undertaken in accordance with the national regulations in force in the respective territories and airspaces concerned.

The Maastricht Co-ordination Group was established to facilitate decision making by determining a common position for the Four States (Belgium, Germany, Luxembourg and the Netherlands) in all matters relating to the operation of air traffic services at MUAC. Day-to-day responsibility for operations has been delegated to the Director of MUAC by EUROCONTROL's Director General. Each of the Four States retains its own regulatory competence.



Regulation

In addition to the international regulatory regime, air navigation service provision at MUAC is subject to four national regulatory regimes, each specifically defining applicable rules and regulations. Over recent years, regulation and oversight of MUAC have been exercised in a coordinated manner by the Four States.

Supervision and oversight

Further to the adoption of Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the Single European Sky (the framework Regulation), each of the Four States has established National Supervisory Authorities (NSAs). In Belgium it is the Belgian Supervisory Authority for Air Navigation Services (BSA-ANS); in Germany, the Federal Supervisory Authority for Air Navigation Services (BAF); in Luxembourg, the Civil Aviation Authority (CAA Luxembourg) and in the Netherlands, the Human Environment and Transport Inspectorate (ILT) of the Ministry of Infrastructure and the Environment.

The Four States' NSAs have created two bodies to support the oversight of MUAC: the NSA Committee, representing all four NSAs, and having a coordination and advisory role for the relevant national decision-making authorities on oversight issues; and the Common Supervisory Team, composed of personnel from the cooperating NSAs, who have an executive role in performing document examinations, audits and inspections.

Designation of MUAC as an air traffic service provider

In accordance with Article 8 of the Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the Single European Sky (the service provision Regulation), EUROCONTROL was designated as an air traffic service provider in the Netherlands, by amendment to the Aviation Act in October 2007. Belgium, Germany and the Netherlands maintain the designation of EUROCONTROL as an air traffic service provider as per the Maastricht Agreement and the relevant national laws.

Certificates

In line with Single European Sky legislation, MUAC holds the certificate for the provision of air navigation services in the European Community. The certificate was granted in 2006 by the Netherlands' Transport and Water Management Inspectorate and Directorate General for Civil Aviation and Freight Transport.

In 2009, the Belgian Supervisory Authority for Air Navigation Services certified MUAC for the provision of unit and continuation training for air traffic controllers and training to act as on-the-job training instructor, competence examiner and/or competence assessor to deliver air traffic services. This certificate was updated in 2011 pursuant to Commission Regulation (EU) No 805/2011.

In line with Single European Sky legislation, MUAC holds the certificate for the provision of air navigation services in the European Community. MUAC also holds ISO 9001:2008 certification to provide customers with Air Traffic Management, Communications and Surveillance Services consistent with international standards, including the procurement, integration and maintenance of technical systems, and the provision of ATM specific training. The certificate was re-issued on 21 December 2015 and is valid until 14 December 2017.

Controller licensing

Since March 2010, the Belgian Civil Aviation Authority has been the licence-issuing authority for air traffic controllers and student air traffic controllers at MUAC. MUAC controllers hold a Belgian ATC licence for the delivery of services in Belgian, Dutch, German and Luxembourg airspace. The licences are issued in accordance with Commission Regulation (EU) No 805/2011 of 10 August 2011, which lays down detailed rules for air traffic controllers' licences and certain certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

Maastricht Coordination Group

BELGIUM

Head of Delegation

Patrick VANHEYSTE	Federal Public Service for Mobility and Transport **Director Belgian Supervising Authority for ANS**

Other participants

Theo NSENGIMANA	Belgian Civil Aviation Authority
Maj. Tom VAN HEUVERSWYN	Belgian Armed Forces – Air Component
Christian BERLANGER	Belgocontrol

GERMANY

Head of Delegation

Dirk NITSCHKE	Federal Ministry for Transport and Digital Infrastructure

Other participants

Prof. Dr. Nikolaus HERRMANN	Director of the National Supervisory Authority
Mr Aleksandar VASILEV	Federal Ministry for Transport and Digital Infrastructure
Mr Karsten HARTWIG	Ministry of Defence
Col. Andreas HOPPE	Ministry of Defence
Andreas PÖTZSCH	Deutsche Flugsicherung

LUXEMBOURG

Heads of Delegation

Mr Pierre JAEGER	Director General of Civil Aviation

Other participants

Mr Claude LUJA	Directorate of Civil Aviation
Mr Kevin SCHROEDER	Ministry of Sustainable Development and Infrastructure

NETHERLANDS

Heads of Delegation

Mr Paul VAN GURP	Ministry of Infrastructure and Environment **Chair of the Maastricht Coordination Group during 2015**

Other participants

Eric DE VRIES	Ministry of Infrastructure and Environment
Lt. Col. Leon CREMERS	Ministry of Defence
Bert ROLVINK	Luchtverkeersleiding Nederland

OBSERVERS

Volker DICK	Staff Committee Servants
Frederic DELEAU	Staff Committee Servants

Management

Director General of EUROCONTROL

Frank BRENNER

MUAC Board

Jac JANSEN	Director
Ian MIDDLETON	Head of Operations Domain
Peter NAETS	Head of Engineering Domain
Chris STADLER	Head of ATM Services Delivery
Niels LOKMAN	Head of Strategy and Priority Management (from 1 June 2015)
Bart VANDERSMISSEN	Head of Change Management
Flemming NYRUP	Head of Performance Management
Robin HICKSON	Head of Stakeholder Management
Onno REITSMA	Head of Support Services Delivery
Keith CARTMALE	Safety Manager
Örjan ANDERBERG	Quality Manager

Frank Brenner
Director General of EUROCONTROL

Paul Van Gurp
Chairman of the Maastricht Co-ordination Group during 2015

MCG CHAIRMAN AND DIRECTOR GENERAL'S STATEMENT

We are pleased to report that over the past business cycle, MUAC's overall performance in the European ATM landscape remained strong. In general, excellent services were delivered to the European ATM network, and, for the first time since MUAC established its Safety Management System (SMS), it achieved zero risk-bearing incidents in MUAC airspace. Furthermore, a level 4 was achieved in all areas of the SMS maturity, thereby already exceeding the target level required for the Single European Sky (SES) Reference Period 2 (RP2).

Despite the delivery of higher than planned capacity throughout the business cycle MUAC's delay targets could not be met. This was mainly due to soaring and unpredicted traffic increases, continued geographical traffic fluctuations and other disruptions beyond MUAC's control.

Following the suspension of important airspace design projects, it is now clear that, in the short to medium term, FABEC is unlikely to deliver the required solutions for the structural performance issues within the MUAC area of responsibility. Solutions are therefore being developed locally or bilaterally with the relevant key partners and stakeholders in order to ensure that strategically vital improvements can be implemented in the interests of the aviation community.

In 2015, the 41 Member States enlarged EUROCONTROL's Maastricht Upper Area Control Centre mandate significantly by inviting MUAC to conduct military Air Traffic Control in the Hannover UIR (Upper Information Region). At the same time, continued preparations to integrate the military services in the Amsterdam FIR (Flight Information Region) also remained an important activity. These developments will bring further benefits to the States, service providers and airspace users alike, and as they are also in line with the ambitions of the Single European Sky, the Four States strongly support these projects and their objectives.

Another priority for the year was the continued effort to support the project on cost allocation between Parts I (the all-States budget) and III (the MUAC budget) of the EUROCONTROL Budget.

RP2 will continue to be challenging for MUAC, particularly with regards to capacity and cost. However, we are confident that MUAC has the right culture to address these challenges, and is well placed to overcome them. We therefore encourage the MUAC management and employees to keep up the good work in order to meet performance targets and deliver tangible value to the network.

Jac Jansen
Director, MUAC

DIRECTOR'S STATEMENT

2015 proved to be yet another challenging year for MUAC. In general, the business cycle was marked by stronger than forecasted air traffic growth and, as a result of the variations in jet fuel prices and national unit rates, MUAC experienced substantial changes to traffic patterns as airspace users optimised their choice of routes in search of maximum efficiency at minimum cost.

This optimisation resulted in large variations of traffic demand especially in the Brussels and Hannover sector groups. Consequently, it was deemed necessary to apply ATFM protective measures in order to re-distribute traffic flows.

Despite these challenges the overall performance remained strong in the areas of safety, cost-effectiveness and environment, while capacity suffered from the aforementioned fluctuations in demand. Although MUAC did not meet the 2015 delay targets, our strong performance and the context in which it was achieved has been positively recognised by our main stakeholders.

A large number of operational, technical and managerial programmes were developed and implemented throughout the course of the year to help ensure that high levels of performance could be maintained over the coming years.

Traffic increased significantly by 1.9% on the previous year, and an all-time high of more than 1.7 million flights was reached.

The overall safety performance remained strong with zero Category A and B incidents with a MUAC contribution. The effectiveness of the Safety Management System has improved to at least Level 4 in all areas thereby already meeting the target for Single European Sky (SES) Reference Period 2 (RP2).

Punctuality decreased to 97.7% of flights unimpeded. Despite the continuous delivery of greater-than-planned capacity, the average delay per flight increased to 0.34 ADM (average en-route ATFM delay per movement) as a result of unbalanced traffic demand. Mitigation measures, implemented as of week 25, did however successfully help to contain the increase of delay.

The total economic cost per flight-hour (€2015) was €323 – 9.1% up on 2014, mainly driven by an increase of delay costs. However, total service provision costs were reduced to €135.4 M - 7.0% down on 2014, and back to 2011 levels. Controller productivity remained 'best in class', with 1.97 composite flight-hours per controller-hour on duty – a slight increase from 2014. Employee numbers fell to 613 – 1.8% down on 2014.

After the economic recession, which resulted in business stagnation, effective cost-containment measures aimed at stabilising our cost base were implemented. Not only were costs efficiently tackled, but also MUAC's profitability increased to the highest levels, driven by a sharp increase in German route charges and genuine traffic growth in the Brussels and Deco sectors.

The cost reduction processes are continuing to pay dividends, and through our continuous change programmes, I expect to achieve greater efficiencies and further cost savings in the future. However, an appropriate balance must be found to facilitate the necessary investment in future technological improvements, safety enhancements and participation in key SESAR validations.

In 2015, flight-efficiency programmes continued to deliver tangible benefits to airspace users. The provision of detailed free route airspace reports to aircraft operators resulted in savings of millions of euros by enabling those operators to reduce the amount of fuel carried on each flight as well as by reducing the number of miles flown. Direct route usage by our main customers increased to 77% generating savings in the order of 866,905 NM for aircraft operators compared to the fixed-route network. For several airlines, total usage of free routes was above 90%.

At the tactical level, the allocation of direct routes resulted in a total flight distance reduction of 6,323,000 NM (or 4.6 NM on average per flight), saving more than 38,000 t of fuel and reducing CO_2 emissions by 126,000 t. In addition to the flight efficiency programmes, we have also implemented measures to reduce our overall energy consumption at MUAC's own facilities. This has led to an estimated reduction of electricity consumption of 12,000 kWh/year equivalent to a CO_2 reduction in excess of 8 t per year.

I am proud to submit this report as it highlights the successful initiatives that have contributed to our strategy and performance achievements. I am also confident that everyone at MUAC will continue to strive to maintain our market-leading position in the core European area and will look forward to contributing further to the efficiency of the network.

2015 HIGHLIGHTS

01

MUAC took part in the Large Scale SESAR Demonstration (LSSD) project 'Optimised Decent Profiles (ODP)'. The aim of the project was to demonstrate the use of cross-border ODPs for eight aerodromes' arrival flows - MUAC's participation was specific to demonstrations involving arrival flows into Frankfurt.

02

iFMP (Integrated Flow Management Position) tool becomes fully operational providing an integrated solution tailored to MUAC needs for traffic management.

Two new transmitter towers are announced to be built on MUAC's premises to replace Brussels sectors transmitters and antennas.

03

Free Route Airspace Maastricht and Karlsruhe (FRAMaK) and the Heathrow Cross-Border Arrival Management (XMAN) projects are honoured with a Jane's Award at the World ATM Congress.

Consistently higher than forecasted traffic in the Brussels sector group is observed.

04

The "Mission 2025" report illustrating the future role of MUAC (Air Traffic Management and ATM data Services provision to both civil and military airspace users) is presented to the 88th meeting of the Maastricht Coordination Group.

As part of the Brussels Sectorisation Study, the implementation of the Olno High sector takes place.

The 2014 MUAC Safety Performance Report is released highlighting the overall positive safety performance of the Centre.

05

The Radio Direction Finder System (RDFS) contract is signed and planned to be operational in the MUAC OPS room by the end of 2016.

Eight new Ab-Initio students start their training activities at ENAC in Toulouse.

For the 13th consecutive year, the ATM Cost-Effectiveness (ACE) 2014 Benchmarking Report confirms MUAC as one of Europe's best-performing air navigation service providers with the highest controller productivity.

06

As a result of higher than forecasted traffic demand in the Brussels sector group, an off load strategy is implemented. The measure is aimed at achieving a better distribution of traffic through the MUAC airspace thereby optimising the use of available capacity.

Live trials start as part of the iStream (integrated SESAR Trials for Enhanced Arrival Management) project with the aim to increase fluidity of air traffic in the arrival control sectors.

The new LARA system becomes operational in the Brussels sector group.

07

The New Voice Communication System (NVCS) is installed at MUAC.

08

09

10

EUROCONTROL and the Brazilian Department of Airspace Control (DECEA) sign an Agreement enhancing cooperation in capacity management support and exchange of operational flight data.

11

The ATC2ATM Programme is launched in an effort to drive forward future developments in capacity and ensure that MUAC maintains its 'best in class' status.

The Flight Data Processing System 2.0 (FDPS 2.0) becomes operational replacing the obsolete hardware with a state-of-the-art standard.

MUAC executives meet airline representatives in Amsterdam as part of the annual customer consultation meeting.

MUAC becomes the first ANSP to provide operational XMAN service to NATS for inbound flights to London Heathrow.

12

The Free Route Airspace Maastricht and Karlsruhe (FRAMaK) project delivers more than 550 direct routes in the upper airspace controlled by MUAC and the Karlsruhe UAC.

The Provisional Council approves the MUAC OAT Provision project resulting in the integration of the LIPPE RADAR at MUAC; and Provision of Military ATS in the Amsterdam FIR.

The European Union's Connecting Europe Facility (CEF) agrees to co-finance the ADaaS (ATM Data as a Service) project with a €2.45 M contribution.

MUAC is awarded ISO 9001:2008 re-certification.

Maximising ATM performance in challenging times

KEY RESULTS

The business cycle was marked by uneven traffic growth and major fluctuations in traffic patterns, in particular in the Brussels and Hannover sector groups. Furthermore, adverse weather conditions heavily impacted operations and service delivery in MUAC congested areas during the summer. Despite the delivery of higher than planned capacity, the aforementioned challenges hampered the achievement of capacity, economic cost-effectiveness and environmental targets. However, MUAC managed to minimise the effect of factors beyond its control such as changes to traffic patterns and route-charges as well as oil price variations and maintain a high level of service provision to our customers.

Key results vs Annual Plan targets at a glance

MUAC	Target/Forecast 2015	Result
TRAFFIC		
(STATFOR Oct 2014 – Baseline)	MUAC: +2.2% Brussels: +1.6% Deco: +2.3% Hannover: +3.1%	MUAC: +1.9% Brussels: +1.4% Deco: +3.8% Hannover: +0.2%
SAFETY		
	Effectiveness of Safety Management – Achieve a minimum level 4 (or 80%) in each of the 11 study areas; improve Safety Culture from level 3 to level 4.	A minimum Level 4 in all areas has been achieved √
	RAT methodology applied for severity classification for all reported occurrences (i.e. 100% by the end of RP2)	100% applied √
	No CAT. A+B incidents – (threshold is max. 3 incidents)	No incidents √
	Just culture – preparation for 2019 target	In progress
CAPACITY		
(average delay per flight in minutes)	0.18 (all delay causes) 0.14 (controllable delay causes)	0.34 x 0.23 x
ENVIRONMENT		
(reduced route extension)	Not directly applicable at single ANSP level (see table below) However, MUAC contribution to the FABEC KEA indicator is measured via internal targets:	
	Monitoring of improvement of REDES and RESTR indicators	REDES: 3.82% RESTR: 1.43%
	Monitoring of horizontal flight inefficiency: planned REDES (max 7.50% in 2019), actual REDES (max 3.90% in 2019) planned RESTR (max 1.80% in 2019)	 7.82% 4.00% 1.87%
	Annual target for actual RESTR: 0.55%	0.44% √
COST-EFFICIENCY		
(Cost-basis and MUAC equivalent unit rate (€2015) For RP2, MUAC is subject to traffic risk sharing.	Approved MUAC cost-basis: €146.9 M The Equivalent Unit Rate is a monitoring value and no target was set in the Annual Plan. However, the Equivalent Unit Rate planned for 2015 was €22.6 (equating €146.9 M and 6.5 M service units)	135.4 M€ √ 20.4€ √ (equating to €135.4 M and 6.6 M service units)
CUSTOMER ORIENTATION		
	More than 80% satisfaction rating with 10 key accounts	100% highly satisfied √

Key results vs RP2 targets at a glance

	Target	Actual				
Safety at local level – RP2		**2015**	**2016**	**2017**	**2018**	**2019**
Level of effectiveness of safety management	Min. C	√	Min. C	Min. C	Min. C	Min. D Safety culture min.C
Application of the severity classification based on the Risk Analysis Tool (RAT) methodology	25%	√	50%	≥ 80%	≥ 80%	100%
Reporting Just culture by 2019	n/a	In progress	n/a	n/a	n/a	√
Capacity (average delay per flight in minutes)	0.18	0.34 x	0.18	0.18	0.18	0.18
Environment (KEA improvement)	Value: 3.30%	1.72%	Value: 3.22%	Value: 3.14%	Value: 3.05%	Value: 2.96%
Cost-efficiency	Considered at national level (see table above)					

Disproportionate and unpredicted traffic growth

In 2015, air traffic increased by 1.9% over 2014, reaching a total of 1,702,263 flights.

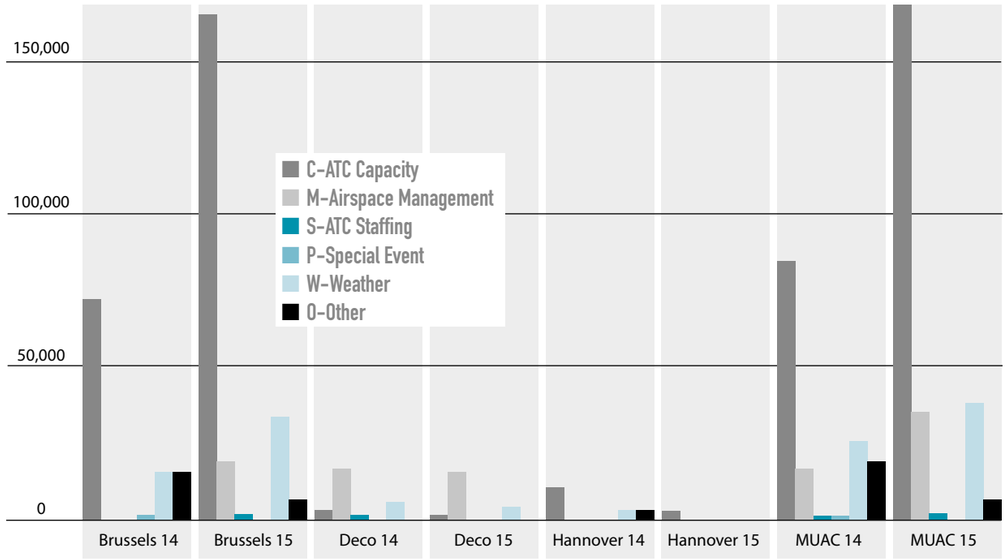
	2014	2015	%
MUAC traffic (controlled flights) – NM	**1,671,185**	**1,702,263**	**1.9%**
Traffic Brussels – MOST*	807,498	818,966	1.4%
Traffic Deco – MOST*	611,129	634,575	3.8%
Traffic Hannover – MOST*	628,409	629,596	02%
*MOST: Maastricht Operational Statistics Tool			

This figure is in line with the baseline scenario of the STATFOR seven-year forecast (February 2015) and confirms a solid return to growth in the MUAC airspace from the 2008 pre-crisis traffic values.

However, traffic at the sectorial level did not develop as predicted. Over the first 25 weeks of 2015 actual traffic growth was 1.7% which is within the range of the STATFOR forecast (see table below). Nevertheless, actual figures at sectorial level showed an inaccurate and uneven distribution in comparison to their respective predicted ranges. Indeed, traffic in the Brussels sector group grew by 3.6% versus a predicted range of -0.2% <-> +2.6%. Whereas, the Hannover sectors handled far fewer flights than forecasted (i.e. more than 3.3% less than predicted).

		MUAC	Brussels	Deco	Hannover
Week 25 – 2015*	**Cumulate**	**1.7%**	**3.6%**	**1.7%**	**–2.2%**
	High	3.2%	2.6%	3.2%	4.1%
STATFOR 2015 (Sep 2014)	Baseline	2.2%	1.6%	2.3%	3.1%
	Low	0.5%	–0.2%	0.1%	1.1%

* Data source: MOST



MUAC delay per regulation type by sector group – Week 25 – 2014/2015

Minutes of en-route ATFM delay by causes of delay per sector group (2014/2015)

This chart shows the distribution by sector group of the minutes of en-route ATFM delay as of week 25 in 2014 and 2015. Capacity-related delay in the Brussels sectors drove the total MUAC increase in 2015 .

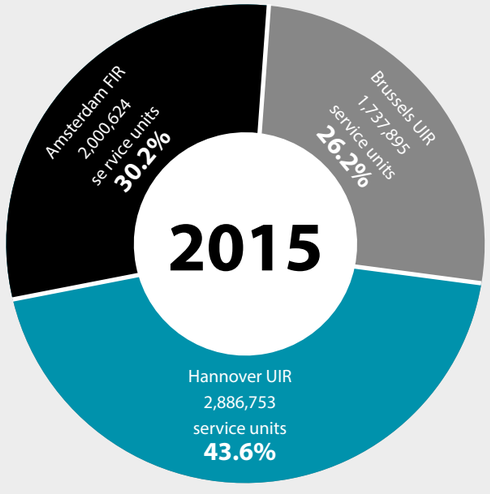
This disproportionate traffic increase coupled with a higher than forecasted demand in a rather small and already congested portion of the MUAC airspace, led to increased ATFM delays for MUAC in 2015.

In the short term, MUAC's room for manoeuvre was limited to a few tactical measures which only partially reduced or mitigated the challenges described above.

Therefore, as of week 25, an off-load strategy was implemented in which traffic flows were shifted from the Brussels to the Deco sectors. This mitigation action alleviated the pressure on the Brussels sectors thereby contributing to the containment of overall delay.

In 2015, average daily traffic reached 4,664 flights, while the average daily traffic over the key summer months (May-October) increased to 4,855 flights versus 4,818 flights in 2014. The summer months saw a 0.8% increase in traffic compared to 2014, mainly driven by the Deco sector group which experienced a +4.1% rise as a direct result of the aforementioned traffic shifts implemented as of week 25.

MUAC generated 2.3% more service units in 2015 mainly driven by an increase in the Brussels sector group (+3.8%). Service unit increases in Brussels (+3.8%) and Hannover (+0.9%) were higher than the percentage increase of controlled flights in 2015 over 2014 (+1.4% and +0.2% for Brussels and Hannover sectors, respectively). This suggests that the average weighting factor for traffic controlled by Brussels and Hannover sectors increased in 2015.



Service units in 2015

Breakdown of service units in the Amsterdam FIR, the Brussels UIR and the Hannover UIR respectively. Service units increased by +2.3% over 2014.

	Service units 2014	Service units 2015	%	Share
Brussels UIR	1,673,754	1,737,895	+3.8%	26.2%
Hannover UIR	2,861,901	2,886,753	+0.9%	43.6%
Amsterdam FIR	1,937,589	2,000,624	+3.3%	30.2%
MUAC	**6,473,244**	**6,625,272**	**+2.3%**	**100.0%**

Safety

In line with Commission Regulation (EU) No 691/2010, laying down a performance scheme for air navigation services and network functions, the three primary leading safety performance indicators which are closely monitored at MUAC are the effectiveness of the Safety Management System (SMS), the application of the severity classification of the Risk Analysis Tool (RAT) and the reporting of Just Culture.

Lagging safety performance indicators such as the trend in separation infringements provide additional data which help to establish safety trends.

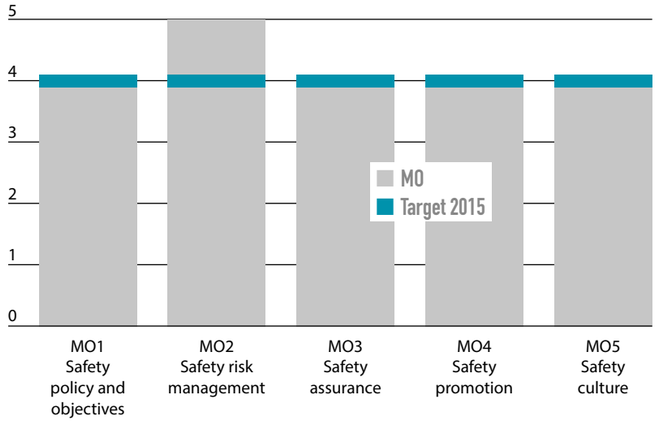
Over the course of 2015, MUAC's overall safety performance was excellent. The reporting culture continues to be positive and for the first time since the SMS was implemented, MUAC achieved its target of zero risk-bearing incidents in the airspace. However, there was a technical failure of the communications function which resulted in traffic restrictions being applied. All the other lagging indicators remained within the defined threshold values despite the increase in traffic. Notwithstanding this excellent record, it is vital to avoid complacency. The Brussels sector group continues to experience the highest percentage increase in traffic, and still records the highest level of separation infringements, although the geographical hot-spots have disappeared in 2015.

Leading safety performance indicators

Effectiveness of Safety Management

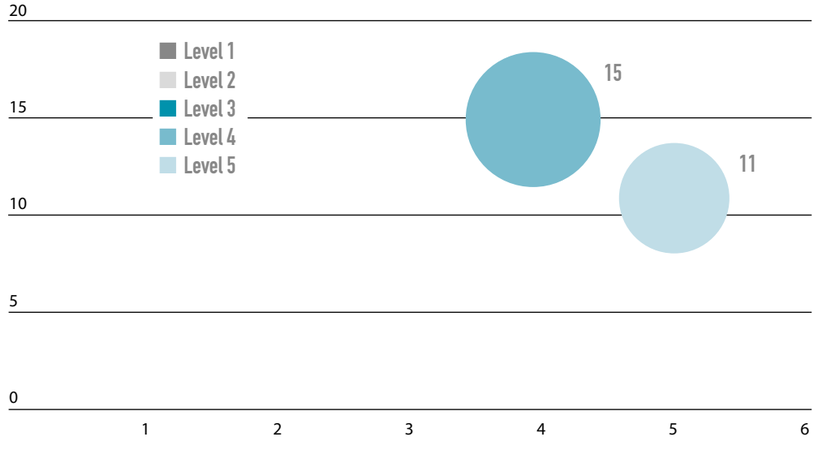
The internal MUAC target up to 2019 is to achieve a minimum of level 4 in all of the five Management Objectives: MO1 – Safety Policy and Objectives, MO2 – Safety Risk Management, MO3 – Safety Assurance, MO4 – Safety Promotion and MO5 – Safety Culture.

This has been achieved in 2015 with the implementation of targeted development activities on emergency/ contingency response plans and the policy on information sharing. The challenge now is to maintain this level up to and beyond 2019.



Effectiveness of Safety Management

Management Objectives (MO) 2015



Effectiveness of Safety Management – Score 2015

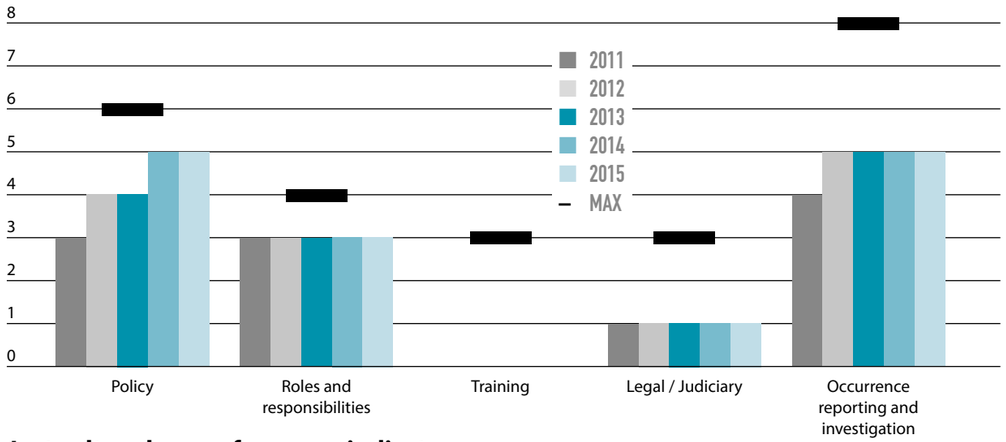
Application of the severity classification of the Risk Analysis Tool (RAT)

MUAC continues to classify all its Separation Minima Infringements (SMI) and ATM Specific Technical Events (ATM-SE) using the RAT methodology as required by the performance scheme.

Reporting of Just Culture

There are no changes in the reporting of Just Culture compared to last year.

The Just Culture project, established in 2014, is aiming to achieve the targets set for RP2 in the FABEC Performance Plan.



Just culture key performance indicator

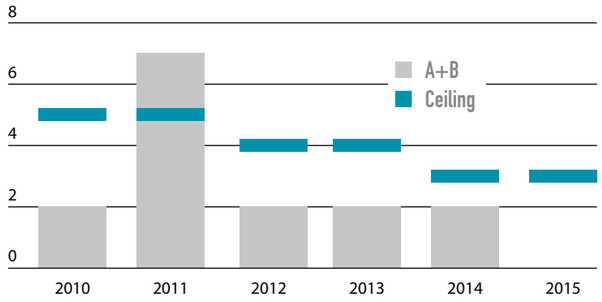
A survey of the Just Culture in place at MUAC was conducted in 2015. This graph shows the number of positive answers to the 24 questions (broken down into five domains) which were included in the Just Culture questionnaire. The questionnaire gave only two possible answers ("Yes" – 1 and "No" – 0).

Lagging safety performance indicators

The frequency of severity A and B incidents plotted against time is the basis for the internal lagging safety key performance indicator for 2015. The annual MUAC Business Plan defines the ceiling for this self-imposed value. Additional activities are triggered whenever the ceiling is exceeded leading to further analysis as to the existence of systemic issues which may have caused these occurrences.

For MUAC, the most important safety goal is to ensure that, within its area of responsibility, it does not contribute to any accidents or any separation infringements. For 2015, a ceiling of three Severity A and B incidents was set to take into account the variability of the diverse factors impacting safety performance.

In 2015, the safety target was achieved; the actual number of severity A and B separation infringements attributed to MUAC was 0 (no severity A or severity B incidents).

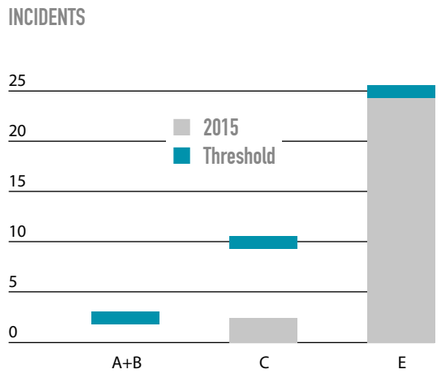


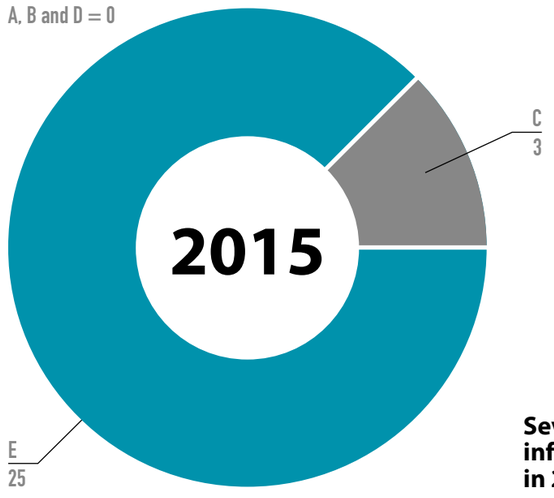
Severity A and B separation infringements attributable to MUAC (2010-2015)

Severity A and B incidents refer to serious and major incidents respectively. Severity A (serious) refers to an incident where an aircraft proximity occurred in which there was a serious risk of collision. Severity B (major) denotes the occurrence of an aircraft proximity in which the safety of the aircraft may have been compromised. The severity scoring system based on the Risk Analysis Tool (RAT) was introduced in 2012.

In addition to this lagging performance indicator on the severity A and B incidents, the total number of severity C and E separation minima infringements with a MUAC contribution is also tracked. The aim of these indicators is to provide an early warning that the key performance indicator for the A and B severity classifications may be under threat, thus producing a more complete picture of the overall risks. In 2015, a ceiling of 10 severity C and 25 severity E separation minima infringements with a MUAC contribution was defined. For 2015, the actual number of incidents reported was: severity C – 3 and severity E – 25.

Severity A/B, C and E separation infringements attributable to MUAC (2015)

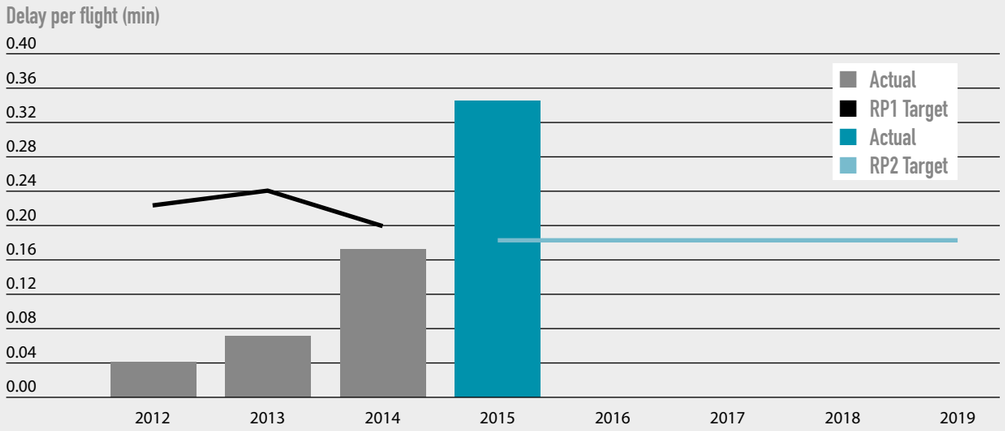




Severity A, B, C, D and E separation infringements attributable to MUAC in 2015

Capacity

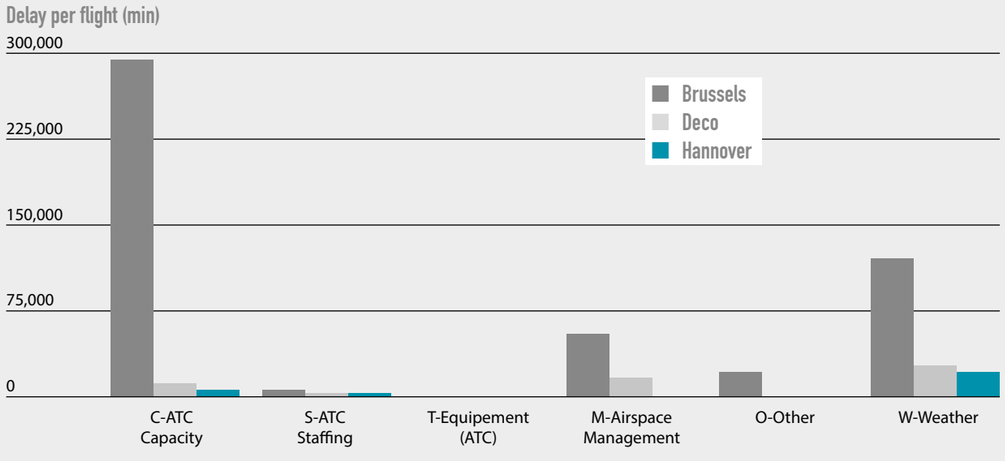
Despite the fact that MUAC delivered higher than planned capacity, the delay target set for 2015 of 0.18 minutes average delay per flight could not be achieved. As a result of the higher than forecasted traffic during the first six months of 2015 in the Brussels sector group, delay increased significantly to 0.34 minutes per flight from 0.17 in 2014.



MUAC en-route ATFM delay per controlled flight

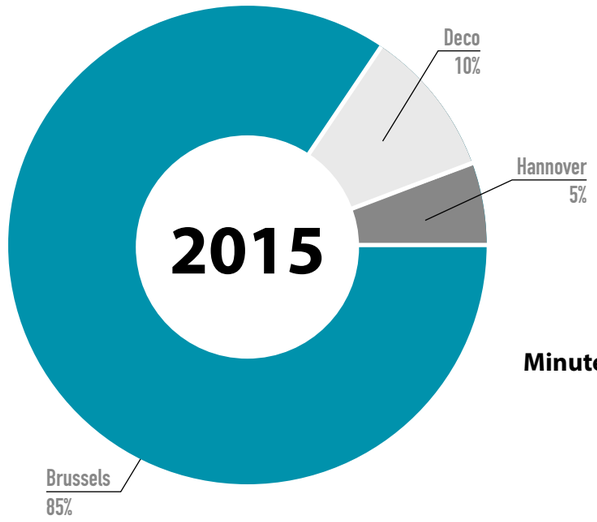
Average en-route ATFM delay per controlled flight (2012-2015) and RP2 targets (2015-2019).
In 2015, MUAC's average en-route ATFM delay per controlled flight increased from 0.17 to 0.34 minutes.

The delay generated in the Brussels sectors accounted for 85% of total MUAC ATFM delay in 2015.



MUAC delay per regulation type - 2015

Average en-route ATFM delay per controlled flight by causes of delay by sector group (2015)
This chart shows the distribution by sector group of the average MUAC en-route ATFM delay per controlled flight in 2015. Capacity-related delay in the Brussels sectors drove the total MUAC increase in 2015.



Minutes of delay by sector % - 2015

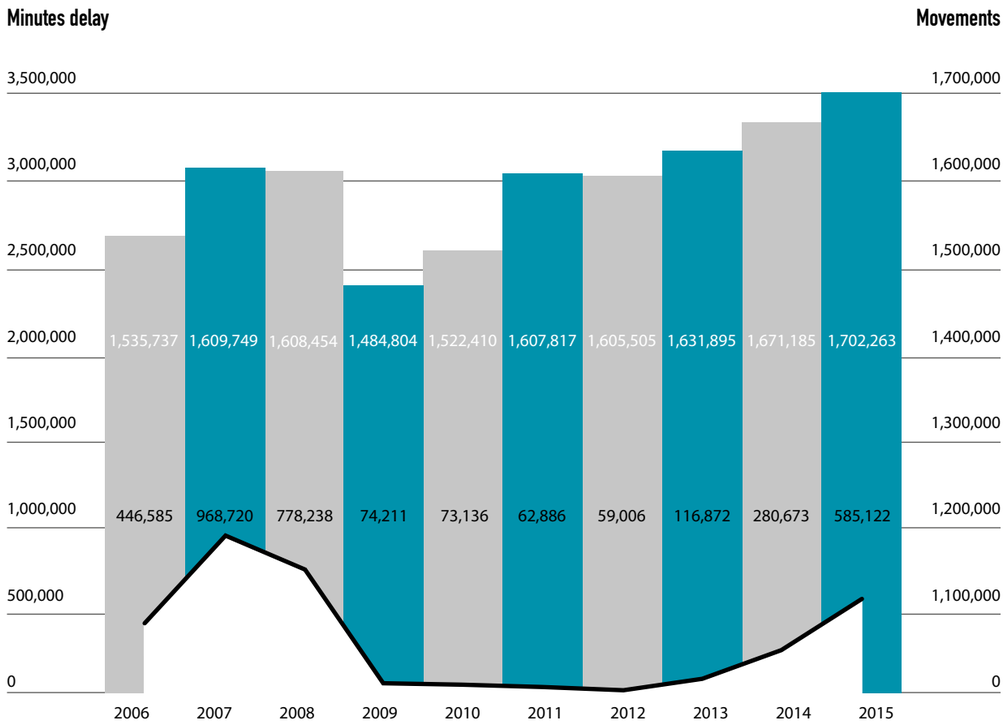
Even with the increase in delay in 2015, and in spite of the challenging traffic scenario described earlier, MUAC still managed to keep punctuality at reasonable levels, with 97.7% of flights unimpeded.

Furthermore, with 1.97 composite flight-hours per air traffic controller-hour, MUAC improved air traffic controller productivity throughout the 2015 business cycle. In fact, following a rise of flight-hours (+2.3%), controller productivity increased by 0.4%. One of the main factors explaining this efficiency gain is the maximisation of MUAC capacity resulting from the shift of traffic from the overloaded Brussels sectors to the Deco sectors as of week 25.

MUAC	2014	2015	% variation
IFR flight-hours controlled	587,342	600,969	+2.3%
ATCOs/OPS hours on duty	299,908	305,613	+1.9%
ATCO productivity	**1.96**	**1.97**	**+0.4%**

Air traffic controller (ATCO) productivity 2014-2015

ATCO productivity increased from 1.96 in 2014 to 1.97 in 2015. This indicator is the ratio between IFR flight-hours controlled and ATCO-hours on duty. In 2015, although the number of ATCO-hours increased by 1.9%, MUAC controlled more IFR flight hours (+2.3%) hence generating a 0.4 % increase in productivity.



Traffic and ATFM delay trends 2006-2015

2015 saw an increase in traffic of 1.9% while ATFM delays doubled reaching pre-crisis levels. The main challenge for the years to come will be to accurately predict and subsequently accommodate the expected increase of traffic thereby reducing the total minutes of ATFM en-route delays.

The volume of delays reported for the years 2005-2009 in the ATM Cost-Effectiveness (ACE) Benchmarking Report, which is used to calculate the unit cost of ATFM delay, differs from the figures reported in the table above due to the exclusion of tactical delays on the ground (engine off) below 15 minutes.

Mitigating the effects of Frisian Flag

The annual NATO Frisian Flag exercise presents many challenges for both MUAC and aircraft operators. Considerable work was done in April 2015 to ensure safe and efficient operations as well as to mitigate route extensions and high delays in the Delta and Jever sectors.

Environment

Reducing route extension

During the reporting period, flight efficiency benefits continued to be offered to airspace users at both the strategic and tactical levels in order to meet environmental targets.

At the strategic level, the introduction of additional direct routes in MUAC airspace as well as direct cross-border routes offered airspace users the potential to increase the efficiency of their operations.

Data analysis for 2015 reveals that average Free Route Airspace Maastricht (FRAM) usage amounted to 67% and that the total distance saved by operators amounted to 866,905 NM.

Average FRAM usage for main customers (with more than 25,000 flights a year) reached 77%. Only two operators (Norwegian and Brussels Airlines) did not exceed the target of 70% of FRAM usage.

The Centre's constant efforts to promote the benefits of these new routes to airlines resulted in a reduction of the local inefficiency indicator, RESTR, for filed flight plans from 1.88% in 2014 to 1.87% in 2015. For the actual flown routes, the horizontal flight inefficiency indicator, RESTR, stayed very low with a slight improvement from 0.47% in 2014 to 0.44% in 2015, thereby meeting the target.

After the continuous decrease over the last five years, the cross-border flight inefficiency indicator, REDES, for filed flight plans showed a slight increase from 7.68% in 2014 to 7.82% in 2015. Actual trajectory inefficiency also follows this trend - slightly increasing from 3.95% in 2014 to 4.0% in 2015. This is likely to be the effect of route choices made by the airspace users in their search for the optimum/cheapest routes rather than the shortest routes.

At the tactical level the allocation of direct routes in 2015 generated a total route extension improvement of 3.82% vs 3.73% in 2014. This resulted in a total flight distance reduction of 6,323,000 NM (or 4.6 NM on average per flight), saving more than 38,000 t of fuel and reducing CO_2 emissions by 126,000 t.

Energy-saving initiatives and sustainable building elements

In compliance with the environmental legislation in force in the Netherlands, the local authorities are provided with an evaluation of MUAC's annual energy consumption. During 2015, the replacement of water pumps and downlighters in one of the buildings generated an estimated electricity consumption reduction of 12,000 kWh/year as well as a CO_2 reduction of over 8 t per year.

Furthermore, in a bid to progressively and permanently improve the sustainability of MUAC's overall infrastructure, the installation of sustainable elements in the new building has ensured that the Centre minimises its carbon footprint. This included – amongst other things - the installation of a green moss roof, optimal insulation, glass with a low solar heat gain coefficient as well as the use of materials with a low health and environmental impact alongside energy efficient installations.

Cost-efficiency

Increase in economic cost despite performance driven budget

In 2015, the cost base amounted to €135.4 M. In real terms, costs were down by 7.0% compared to 2014 reaching the lowest level since the implementation of an exceptional reduction in 2011 due to accrual accounting and the revalorisation of fixed assets. However, the main cause for the decrease relates to the payment of a performance bonus to staff between 2012 and 2014.

Nevertheless, MUAC managed to stay well within its agreed 2015 budgetary envelope of €146.9 M by saving €12 M in operating costs. The majority of these savings however, were driven by the postponement or non-execution of projects and to a lesser extent by delays in the procurement process.

Following a 2.3% increase in flight-hours controlled, MUAC scored a total financial cost per flight-hour of €225, a value which is €23 lower than the one in 2014 (€248 in €2015).

The total economic cost per flight-hour (also referred to as 'unit economic cost') is used as the main indicator of overall performance as it incorporates both cost of delay and the financial cost of ATM service provision. In this context it is worth noting that the cost of ATFM delay was recently updated by the University of Westminster. Based on this latest update, the estimated average European ATFM delay costs have been adjusted from €88 per minute in 2014 to €100 per minute in 2015.

Despite a significant decrease in unit financial costs, ATFM delay costs increased considerably thus bringing the overall MUAC economic cost up to €323 per flight-hour in 2015 – an increase of 9.1%.

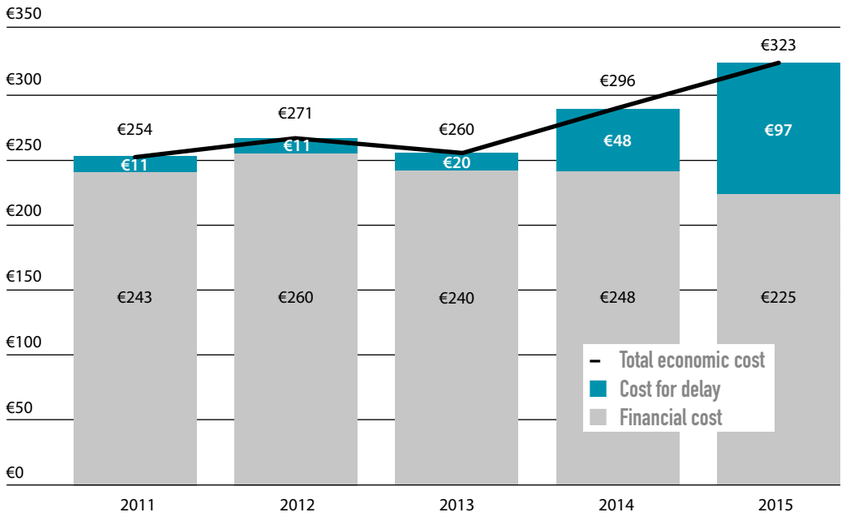
This reflects and confirms that an increasing difficulty to manage uneven traffic flows among the three sector groups might lead to a severe deterioration in service quality over SES RP2. The need for up-to-date and accurate traffic forecasts together with a highly efficient allocation of resources and investments will be essential for keeping high quality standards in this extremely challenging and constantly changing environment.

The key performance indicator for cost effectiveness, defined in the SES II Performance Regulation, is the determined unit rate. Since this is calculated on the basis of consolidated costs at national level, the concept of a MUAC-equivalent unit rate was introduced as a performance indicator taking the specific MUAC service provision costs into account. 'Equivalent' indicates that the calculation does not take the full cost of MUAC service provision into account. For example, EUROCONTROL support costs and the cost of using CNS infrastructure (which is made available free of charge by the Four States), are not included. The target of €22.6 was met following a decrease in the equivalent unit rate from €22.5 to €20.4 in 2015 (-9.1% expressed in €2015). This was the result of a combined effect between the reduction of the MUAC cost-base and a slight increase in the number of service units.

MUAC cost-base (M€ - €2015)	2011	2012	2013	2014	2015	Trend 2014/2015
Staff costs	111.1	121.7	115.3	123.8	114.3	– 7.7 %
Non-staff operating costs	13.3	13.2	12.9	12.0	11.9	– 0.5 %
Depreciation costs	11.1	10.0	9.1	9.3	8.8	– 5.5 %
Cost of capital	1.3	0.7	0.6	0.5	0.4	– 15.6 %
Total costs (M€)	136.8	145.6	137.8	145.6	135.4	– 7.0 %
Exceptional reduction	**–13.5**	**0.0**	**0.0**	**0.0**	**0.0**	
Total costs (M€)	123.3	145.6	137.8	145.6	135.4	– 7.0 %

GAT cost-base 2011 – 2015 (M€ - €2015)

In 2015, the MUAC cost-base was reduced by 7.0% in real terms. This was mainly driven by a general reduction across all cost categories. In particular, staff costs and non-staff operating costs declined by 7.7% and 5.5%, respectively. Overall, MUAC staff levels fell by 1.8% between 2014 and 2015.



Total economic cost per flight-hour (€2015) - Trend 2011-2015

The total economic cost per flight-hour controlled (or unit economic cost) is a standard key performance indicator used in the ATM Cost-Effectiveness (ACE) benchmarking reports, produced by the Performance Review Commission. It is the sum of ATM/CNS costs (or financial cost) and air traffic flow management delay costs per composite flight-hour.
Despite a significant decrease in unit financial costs from €248 to €225, the MUAC unit economic cost for 2015 increased by 9.1% in real terms due to an increase in unit delay costs (from €48 to €97). In 2015, staff costs fell by €9.5 M.

ACE 2014 report again confirms MUAC's strong performance

In May 2016, the ATM Cost-Effectiveness (ACE) 2014 Benchmarking Report was released, once again confirming MUAC's ranking among the top-performing ANSPs in Europe. The economic gate-to-gate cost-effectiveness indicator for MUAC amounted to €295 (€2014) per composite flight-hour while the European average stood at €479. The economic cost-effectiveness indicator in Europe ranged from €798 to €183. It should be noted that the ACE Benchmarking Report is published in 2014 values while this Annual Report is expressed in 2015 values, taking into account an inflation rate of 0.2%.

Risk management

Over the course of 2015, the MUAC risk management process was further consolidated in line with the corporate risk management process. The risk management process facilitates risk identification and monitoring at business process and domain levels as well as within SQS (safety and quality systems). Risks, which are assessed to impact the achievement of MUAC's business objectives, are maintained in MUAC's corporate risk register. Each risk requires a mitigating action for reducing its probability and/or impact.

MUAC's risk register is updated every quarter based on assessments by the responsible risk owners and discussed by the MUAC Board. It is also shared and discussed with the Agency Risk Management Group on a quarterly basis.

Additionally, in 2015, MUAC's high level risks were a recurring item for discussion within the Maastricht Coordination Group (MCG).

CUSTOMER ORIENTATION

Throughout 2015, MUAC continued to focus on further improving customer service. Individual customer consultations which were held during the course of the year as well as the annual November customer consultation meeting helped to ensure that improvements fully embraced customer needs. The optimisation of airspace design and usage along with improved cooperation with the military partners helped to enhance the safety, efficiency and cost-effectiveness of operations. Most notably, the stability of the MUAC ATC system also greatly contributed to sustained high performance.

Customer orientation

Customer relationship management

Customer consultation

During 2015, several activities were undertaken to address customer needs. These included the publication of various reports (annual report, monthly flight efficiency reports and individual customer analysis reports), visits to specific airline operators as well as airline operators' familiarisation visits to MUAC. Further activities included ad hoc query tracking and delivery of the appropriate responses via the collaborative eurSky portal (or email) and the annual plenary customer consultation meeting.

The November customer consultation meeting saw a record attendance, with 20 representatives from American Airlines, Atlas Air, British Airways, Brussels Airlines, Delta, Flybe, Jet2, KLM, Lufthansa, Monarch, Ryanair, SWISS, Thomas Cook, Thomson, TUIFly and United Airlines, as well as the Network Manager's Aircraft Operators liaison and ELFAA (European Low Fares Airlines Association) representatives. Discussion topics included an update on MUAC's 2015 performance, the effects of the Single European Sky, XMAN, Controller-Pilot Data Link Communications, Direct Routeing Airspace and the ATC2ATM Programme. A panel discussion addressed airspace and route-charge changes and their impact on MUAC operations. Other topics included preparations for the following summer (capacity constraints, delay management and priority flights), two-way familiarisation between MUAC and the airlines' operations control centres and the long-term traffic forecast.

During the reporting period, one-to-one meetings with the major airline operators, supported by tailor-made reports of the overall MUAC performance, were also arranged. These bilateral meetings helped to enhance service delivery and efficiency. In particular, they contributed to increased take-up of the direct route network saving airlines several millions of euros.

The collaborative eurSky MUAC customer interface, now in use by some 30 airline operators, has become a major B2B communications and efficiency enabler. The platform allows secure two-way communications and gives access to a range of reports.

Finally, a stakeholder review was conducted at the end of 2015, which gauged customer and stakeholder satisfaction of MUAC performance and services. Specific actions were identified as a follow-up of this analysis. These covered the development of enhanced performance metrics, including measures of resilience and 'over provision', the quantification of trade-offs across service delivery elements and the modelling impact of future European scenarios such as the price of fuel and the impact of route charges.

Managing ATM services

The ATM Services Delivery process is continuously assessed and refined to maintain excellent service quality, increase controller productivity and enhance safety. Despite a challenging environment, with traffic growth exceeding the forecasts, MUAC continued to provide safe and sustainable ATM services.

As well as technical developments, the external contingency topic was opened in the MCG with the ambition of reaching agreement on the way forward early in 2016. The result should further secure the stability and long-term availability of MUAC services. This initiative will become increasingly important with the planned integration of military services in the Hannover UIR and Amsterdam FIR.

2015 saw an increase in overall traffic compounded by a shift in traffic towards the busiest sectors. This un-forecasted shift meant that the delay target for 2015 could not be met. In response, a number of initiatives have been started with the goal to enable MUAC to manage the expected traffic growth in a safe and sustainable way.

ATC2ATM

Following the increase in delay and the need to focus on the performance of daily operations, emphasis in 2015 was put on improvements in streamlining the connection between the pre-tactical and tactical ATC phases. The ATC2ATM programme was set up to initiate, manage and organise a number of projects in this area with the benefits expected to be seen over the next few years. It should be noted, however, that there are limits to what can be achieved when external factors affect traffic flows far beyond forecast predictions.

Performance interdependencies, revenues and unit business value

Managing competing Key Performance Areas (KPAs) under a customer orientation perspective

MUAC is subject to a set of regulatory targets set by the European Commission through its Performance Review Body (PRB). These are grouped into four Key Performance Areas (KPAs): Safety, Capacity, Environment and Cost-Efficiency. The main objective of the Performance Regulation is "to increase the economic, financial and environmental performance of the provisions of the Air Navigation Services in Europe" keeping safety standards and procedures constantly at their highest levels.

The KPAs are strongly interrelated and consequently exert an influence on each other. For instance, any new project increasing capacity will also impact on the cost-efficiency area. On the other hand, aggressive cost reduction measures might result in a critical loss of capacity.

The existence of direct links between performance areas is intellectually accepted by the aviation community although the establishment of a standard formula which describes these quantitative interdependencies is challenging.

However, for each KPA it is feasible to estimate approximate costs.

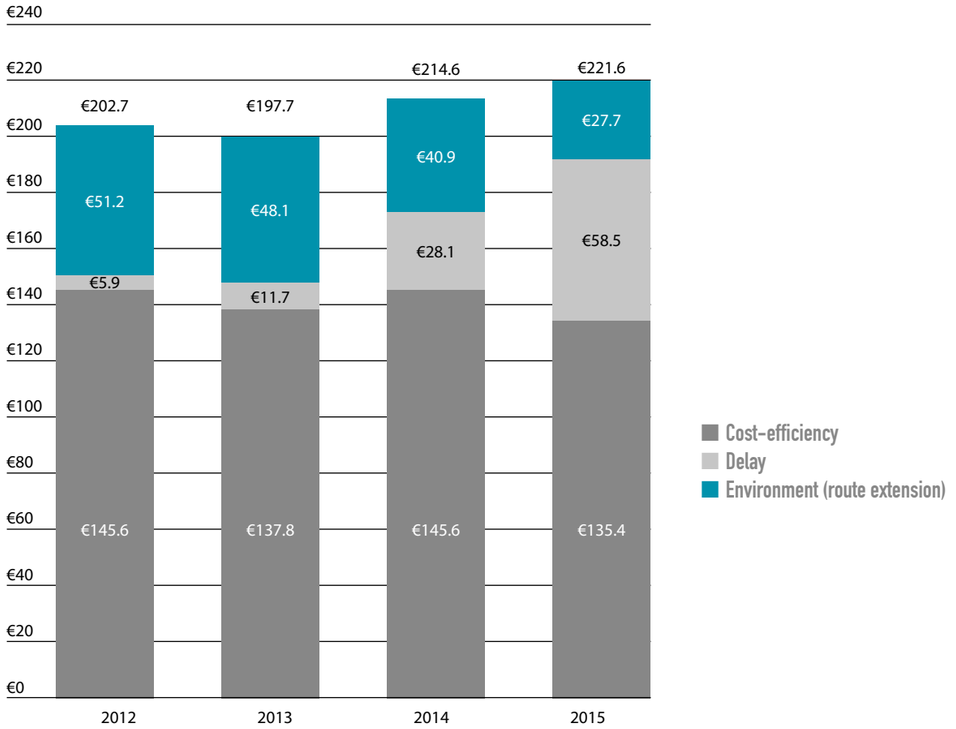
Costs attributable to main KPAs

ANSPs are accountable to their stakeholders for the provision of air traffic control services in the most efficient way and in accordance with the highest safety standards. In this context, MUAC's motto is "Service first, safety always". However, safety is not easily quantifiable and any attempt to economically measure it presents tangible difficulties and uncertainties.

Moreover, cost-efficiency refers to direct costs borne by the Four States to run ATM activities at MUAC while environmental and delay costs are directly borne by airlines.

Environmental costs refer to the extra cost of the jet fuel burned to fly the route extension between the actual flown route and the theoretical shortest distance (great circle) between departure and arrival points. The cost of extra time to fly longer routes is not considered in this analysis due to the relative small size of MUAC airspace. A sharp decrease in jet fuel price reduced the overall economic impact of the route extension in 2014 and 2015.

Costs of delay are a linear function of the average cost per minute of delay and the total minutes of ATFM en-route delays generated.



Total cost per key performance area (€M - €2015) - trend 2012-2015

The total cost for environment is calculated by multiplying the route extension expressed in number of extra Nautical Miles (NM) flown by aircraft, by the average cost of jet fuel burned per NM. Cost-efficiency costs refer to the MUAC cost-base. Costs of delay have been calculated according to the methodology reported in the ACE Benchmarking Reports, which is total minutes of ATFM en-route delays multiplied by €100.

An analysis of the evolution of total costs between 2012 and 2015 suggests that some performance areas are highly impacted by factors which are not directly under MUAC control. In particular, despite a substantial decrease in environmental costs (from €40.9 M to €27.7 M) and financial costs (from €145.6 M to €135.4 M) in 2015, the total cost did not reduce accordingly, but rather reached a new peak. This was driven by a significant increase of the costs of delay (from €28.1 M to €58.5 M). Following a drop in jet fuel prices, airspace users preferred to fly longer routes to avoid more expensive areas since the cost of additional fuel burned was more than compensated by the difference between route charges paid in Germany and those paid over the Netherlands and Belgium.

It is difficult to estimate the optimal point between cost-efficiency and capacity. For example, how do the costs of delay reduce when a unit of cost on the cost-efficiency side is increased? That aside, the way the Route Charges scheme is currently set up poses an additional uncontrollable challenge which can negatively impact and eliminate any positive results achieved in other ANSP-controllable performance areas.

Increased revenue distribution to States

Service units produced within MUAC airspace increased by 2.3% in 2015. Brussels UIR and Amsterdam FIR both experienced more than a 3% increase while Hannover UIR moderately rose by 0.9%. A sharp rise in the national unit rate in Germany played a pivotal role in the distribution of flights across MUAC airspace. Indeed, an increase of more than 16% of the national unit rate (from €77.55 to €90.26 in real terms) made German airspace one of the most expensive in FABEC. Furthermore, a sharp decrease of the oil price also contributed to the shift of traffic flows to alternative cheaper routes.

MUAC €2015	Service units 2014	Service units 2015	Service units 2015/2014 %	National unit rate 2014	National unit rate 2015	National unit rate 2015/2014 %	Revenues 2014 (M€)	Revenues 2015 (M€)	Delta revenues 2015/2014 (M€)	Revenues 2015/2014 (M€)
Brussels-UIR	1,673,754	1,737,895	3.8%	€72.62	€70,79	–2.5%	€121,6	€123.0	€1.5	1.2%
Amsterdam-FIR	1,937,589	2,000,624	3.3%	€66.75	€66.68	–0.1%	€129.3	€133.4	€4.1	3.1%
Hannover-UIR	2,861,244	2,886,753	0.9%	€77.55	€90.26	16.4%	€221.9	€260.6	€38.6	17.4%
Total	**6,473,244**	**6,625,272**	**2.3%**	**–**	**–**	**–**	**€472.8**	**€517.0**	**€44.2**	**9.3%**

Service units, national unit rates and revenues per sector group (€M - €2015) trend 2014-2015

Revenues distributed to States increased by €44.2 M (in real terms) in 2015, with 87% of this additional amount being transferred to Germany.

Despite their highly impacting effects on business strategies, route charges are not controllable by MUAC. Nevertheless, MUAC, in fact, ANSPs in general have to comply with legal requirements which set regulatory targets in the short, medium and long term.

MUAC's main objective is to maximise customer satisfaction by making the best use of available resources and by concretely contributing to the achievement of targets set at FAB level as well as locally within MUAC.

Unit business value (unit revenues – unit costs)

A reasonable judgement on the healthy functioning of a business requires a deeper understanding of the parallel evolution of total revenues and costs. A general increase in total costs is not necessarily negative if an organisation is in the fortunate position of being able to increase its revenues correspondingly higher.

This is the case for MUAC which saw a continuous increase of it business value between 2012 and 2015. Indeed, despite an increase of total costs (with the exception of 2013's €5 M reduction), revenues constantly and substantially increased.

However, costs and revenues should be weighted by the number of service units produced in the MUAC airspace.

MUAC €M €2015		Total costs	Revenues	Business value (revenues–costs)
	2012	€202.7	€449.8	€247.1
RP1	2013	€197.7	€453.4	€255.7
	2014	€214.6	€472.8	€258.2
Total RP1		**€615.0**	**€1,376.0**	**€761.0**
RP2	2015	€221.6	€517.0	€295.3

Unit KPA costs (per service unit) – €2015		Cost efficienty	Delay	Environment (route extension)	Total units costs	Total units revenues	Unit business value (revenues costs)	Service units (SUs)
	2012	€24.0	€1.0	€8.4	€33.4	€74.1	€40.7	6,070,939
RP1	2013	€21.8	€1.8	€7.6	€31.3	€71.7	€40.4	6,322,585
	2014	€22.5	€4.3	€6.3	€33.2	€73.0	€39.9	6,473,244
Average RP1		**€22.7**	**€2.4**	**€7.4**	**€32.6**	**€72.9**	**€40.3**	**18,866,768**
RP2	2015	€20.4	€8.8	€4.2	€33.5	€78.0	€44.6	6,625,272

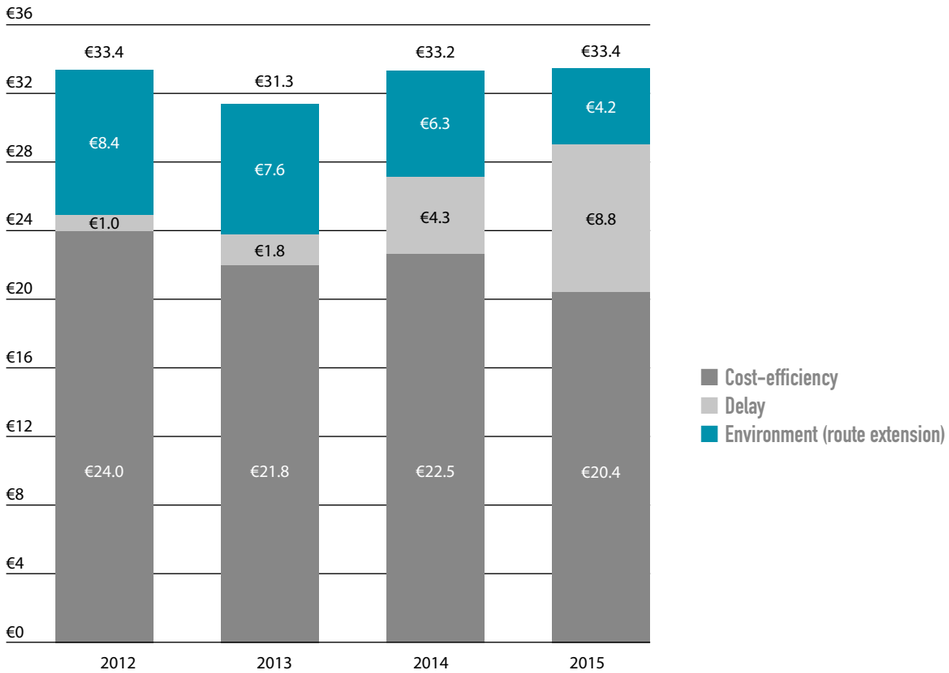
KPA costs per service unit (€2015) - trend 2012-2015

Between 2012 and 2015 unit environmental and cost-efficiency costs constantly decreased from €8.4 to €4.2 and from €24.0 to €20.4, respectively. On the other hand, unit costs of delay followed an opposite trend from €1.0 in 2012 to €8.8 in 2015.

Overall the unit business value (i.e. the difference between total unit revenues and total unit costs) decreased between 2012 and 2014 (from €40.7 to €39.9) and significantly grew in 2015 to €44.6. This was mainly driven by an increase of revenues from €73.0 to €78.0 per service unit. On the other hand, total unit costs remained constant, slightly above €33.

A more detailed analysis suggests that a reduction of €2.1 in unit costs paid by States (from €22.5 to €20.4) was compensated by an increase of €2.3 (from €10.7 to €13.0) in unit costs borne by airspace users.

Unit KPA costs (per service unit) – €2015		Borne by States	Borne by users	
		Cost efficienty	Delay + Environment (route extension)	Total units costs
	2012	€24.0	€9.4	€33.4
RP1	2013	€21.8	€9.5	€31.3
	2014	€22.5	€10.7	€33.2
Average RP1		**€22.7**	**€9.9**	**€32.6**
RP2	2015	€20.4	€13.0	€33.5



Unit costs/SUs (€2015)

In conclusion, in 2015 States benefitted from higher unit revenues and lower unit cost-efficiency costs (i.e. those related to the provision of ATM services) hence maximising their profits. In contrast, the part of costs borne by airspace users increased due to the doubling of unit costs of delay from €4.3 to €8.8.

Nevertheless, as shown in the table above (KPA costs per SU), yearly RP1 unit business value suggests that a range between €39.9 and €40.7 per service unit should represent a fair monitoring value in the absence of uncontrollable events such as major route charge variations.

MUAC's contribution to FABEC performance

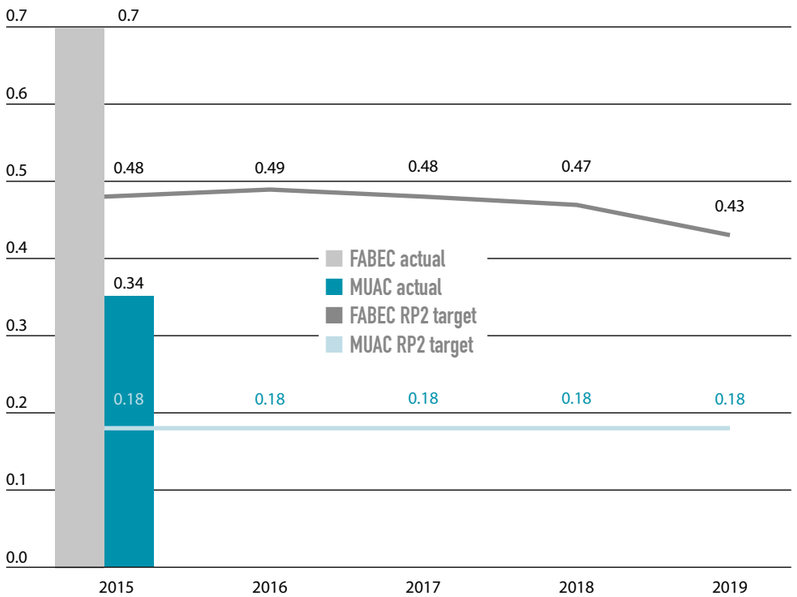
The FABEC performance plan was drawn up to cover SES Performance Plan Reference Period 2 (RP2 - 2015 to 2019). It covers the key performance areas of safety, environment and capacity for the whole region while military mission effectiveness and cost-efficiency targets are addressed at national level. MUAC cost-efficiency targets were agreed by the Four States. In 2015, the air traffic volume in FABEC airspace increased by 1.8 percent from 5,512,253 flights in 2014 to 5,612,328 flights in 2015. For the first time, almost all FABEC control centres recorded a traffic increase in 2015. Nevertheless, there are still some significant variations between control centres and individual sectors. Moreover, when the long-term trend is considered, traffic volume is still below the values seen in 2007.

Less encouraging are the numbers for overall operational performance, which experienced a decline last year. The 2015 en-route ATFM delay per flight (all causes) was 0.70 minutes per flight compared with 0.56 minutes per flight in 2014. The target of 0.48 minutes of average ATFM delay per flight set out in the FABEC performance plan was not met. These values incorporate delay due to all possible causes including capacity and weather. MUAC overshot its target of 0.18 minutes of delay per controlled flight scoring a value of 0.34.

The en-route ATFM delay caused by ANSPs (also known as 'controllable delay') came in at 0.48 minutes per flight. This represents a deterioration in performance compared with the previous year (0.31 minutes per flight) and exceeds the target value of 0.37 minutes per flight. The main reasons for this development were local issues such as capacity shortages, the introduction of new technical systems and unpredicted traffic flow changes.

MUAC, together with DSNA and Belgocontrol, negatively contributed to overshooting the FABEC controllable target beyond the dead band (i.e. +10%), resulting in FABEC having to accept a financial penalty. The penalty is shared among those ANSPs that did not achieve their set targets, in accordance with a methodology that takes into account a weighted percentage of their revenue/budgetary contribution and performance share. The total FABEC penalty has been estimated at €3.9 M, out of which €0.8 M will be borne by MUAC.

For 2016, active countermeasures are being taken that include the shifting of traffic flow, improving air traffic flow and capacity management measures, and re-sectorisation. In particular, with the further deployment of the direct route network, MUAC and its partners continued to push forward a key element of the FABEC airspace strategy aimed at achieving greater operational efficiency.



Average delay per flight (minutes) in the FABEC and MUAC areas during RP1 and RP2

Optimising airspace design and usage for sustained performance

Free Route Airspace gains ground

With a total of more than 550 direct routes published in the upper airspace controlled by MUAC, the network of direct, flight-plannable cross-border routes has considerably expanded over the past five years as part of the Free Route Airspace Maastricht (FRAM1) project, creating a large-scale direct routeing airspace over Belgium, most of Germany, Luxembourg and the Netherlands.

In response to the Pilot Common Project (PCP) requirement to implement Free Route Airspace, ARN Version 2015-2019 of the European Route Network Improvement Plan - Part 2 (ERNIP - Part 2) has been updated accordingly. The objective of ARN Version 2015 - 2019 is the improvement of European ATM capacity, flight efficiency and environmental performance. These will be enhanced through the development and implementation of an improved ATS route network and Free Route Airspace supported by corresponding improvements to the airspace structure and the optimal utilisation rules of both in the ECAC (European Civil Aviation Conference) area.

MUAC has planned the implementation of FRA (FRAM2) in line with the following three phases:

- Phase 1: MUAC AoR, Core Night (00:00-06:00 LCL), FL245+ [Minimum to be PCP compliant], planned for Q4 2017
- Phase 2: MUAC AoR, Weekend, FL245+, planned for Q4 2018
- Phase 3: MUAC AoR, H24, FL245+, planned for Q1 2020

As part of the FABEC Free Route Airspace Programme, local initiatives have started in order to develop a FABEC Free Route environment. DFS Karlsruhe and MUAC have taken the lead in FABEC.

FABEC Flow Optimisation Concept Scenario (FOCS)

The FOCS study was launched to help develop an airspace design for the core area of FABEC that will contribute to performance targets for both horizontal flight efficiency and capacity. The study was concluded in 2015. Some relatively small work packages are now being assessed together with our FABEC partners to see if they can be further developed.

FABEC Implementation Package South-East

MUAC has been actively involved in the FABEC Implementation Project South-East (also known as the 'SWAP'-Project). The goal of this airspace redesign project was to simplify the airspace structure by reversing the orientation of the existing Northbound and Southbound routes roughly between Lyon and Luxembourg. By doing this, the current double cross-over of these routes will be avoided. Such an airspace redesign would also require numerous other changes, including the adaptation of various departure and arrival routes and the re-shaping of military areas.

MUAC, like the other ANSPs, began preparing for this airspace redesign in 2015. On the 6th of November 2015, MUAC officially declared to FABEC that the Centre was ready for the change on the planned O-Date. However, on the 15th of December 2015, DSNA stated that they were not in a position to implement the South-East project. Since then, all FABEC activities for this project have been stopped, and no new implementation date has been given.

FABEC Cross-Border Area (CBA) Land-Central West

The FABEC CBA Land (Step 1) and Central West (Step 2) airspace redesign projects were put on hold in mid-2015 due to dependencies with other projects in the Netherlands (such as the 4th Initial Approach Fix (IAF) and civil military co-location) which meant that sufficient time and resources could not be devoted to FABEC. Careful and transparent management of such dependencies are required for future airspace design projects to become successful. Early implementation packages have been planned and partly implemented. Re-scheduling the implementation date of CBA Land (Step 1) and Central West (Step 2) is not foreseen.

Cross-border Arrival Management – XMAN

In April 2014, following a request by the United Kingdom's NATS ANSP, the trial of the XMAN London Heathrow (EGLL) concept began. This trial involved the co-operation and support of the London, Maastricht, Prestwick, Reims and Shannon ATC centres.

The goal of XMAN is to decrease aircraft holding times at congested airports by reducing their cruising speeds during the final en-route phase of flight. In doing so, flight efficiency is increased as fuel burn levels and CO_2 emissions fall. Moreover, less airborne congestion in terminal areas will also contribute to improved operational safety by reducing pilot/ATC workload.

The successful transition to operational use of XMAN EGLL became a reality in November 2015, with MUAC becoming the first ANSP to provide operational XMAN service to NATS for flights inbound to Heathrow airport.

The success of the XMAN London Heathrow project was recognised at the 2015 World ATM Congress where it was honoured with a Jane's Award for its outstanding achievement in the Enabling Technology category.

FABEC goals are for the XMAN procedure to be rolled out initially for the main airports in and adjacent to FABEC - Amsterdam, Frankfurt, London Heathrow, Munich and Paris Charles de Gaulle. In line with the requirements set out in the European Implementing Rule, the XMAN procedure will be extended to a total of 25 European airports between now and 2024.

Brussels Sectorisation Study

In June 2014, the Brussels Relief Study was launched to investigate the feasibility of creating a third layer within the Brussels sector group to alleviate traffic overloads. The study involved simulations to test various internal sector configurations. Following these simulations, the study was turned into a project with an implementation planned in Q4 2016 or Q1 2017. As a bi-product of this study, the implementation of the Olno High sector took place in April 2015.

MUAC OAT Provision

The MUAC OAT Provision project is the fusion of the two military integration projects for Germany and the Netherlands – Integration of LIPPE RADAR at MUAC; and Provision of Military ATS in the Amsterdam FIR. The contractual arrangements with Germany were finalised and approved by the EUROCONTROL Provisional Council in December 2015. The contractual arrangements with the Netherlands are still being negotiated, and expected to be finalised in 2016.

The project plan was combined from the fusion of the two military integration projects into one single project, with three major milestones:

- Q4 2016 – Integration of DFS CC-UM (LIPPE RADAR) is an institutional change where the DFS staff currently operating at MUAC are to be hired by EUROCONTROL, and military service provisions in the Hannover UIR will be delivered as a continuation of operational service without any major changes.
- Q1 2017 – The operational concept will be adapted to optimise workload balancing between civilian and military air traffic controllers. The civilian controllers will be trained to handle standard military flights as well as basic military procedures like formation splits. With this, the operations of the military-specialised sectors will be reduced so as to allow for the next milestone.
- Q2 2017 – Provision of military services in the Amsterdam FIR above FL245 will be provided by air traffic controllers and flight data operators from the former LIPPE section, who will undergo training for Dutch airspace operations and procedures.

The year 2015 was therefore characterised by the preparation work for the above institutional changes, the fusion of legacy projects and their re-planning as well as analyses of all required operational and technical changes.

Technology

ATFCM/ASM tools portfolio

Throughout 2015, work continued on the improvement of Air Traffic Flow and Capacity Management/Airspace Management (ATFCM/ASM) tools. These deliver efficiency and capacity enhancements by improving the planning of available human and airspace resources months ahead of the day of operations (e.g. the strategic ATFCM phase). Crucially, they will also help achieve environmental performance targets.

Advanced Flexible Use of Airspace – LARA (Local And sub-Regional ASM)

Flexible Use of Airspace (FUA) and Collaborative Decision Making (CDM) are important concepts which are helping to drive the implementation of the Single European Sky (SES) vision. Consequently, increased adoption, and incremental development of LARA (Local And sub-Regional ASM) is key to this process. The tool, which is being developed with the support of the European Commission (EC), covers the entire spectrum of airspace management from ASM levels 2 and 3 (including real-time coordination of airspace activation) to long-term planning.

MUAC has integrated the Belgian cluster: all LARA workstations for the Belgian airspace are connected over a network to the central LARA BE server installed and maintained at MUAC. While this in itself brings immediate operational benefits, it will also allow a direct feed of military airspace planning data into the Flight Data Processing System (FDPS) to further automate the display of active training areas on controller human-machine interfaces (HMIs).

Meanwhile, integration of MUAC into a Dutch cluster, and the subsequent connection of LARA NL to the MUAC FDPS, is technically ready. A trial mode is foreseen in Q2 2016 in preparation for operational implementation in Q4 2016.

Integrated Flow Management Position (iFMP)

The integrated Flow Management Position (iFMP) became operational at MUAC in February 2015. The iFMP is one of the most promising technical developments in the area of Air Traffic Flow and Capacity Management (ATFCM). It is specifically designed to assist with complexity and traffic management as well as workload prediction. Using trajectory predictions from both the Network Manager's system and the local flight data processing system, the tool anticipates the traffic situation according to occupancy and entry rates as well as complexity counts up to six hours in advance. It contains a sector optimiser that can identify the best sectorisation whilst investigating alternatives. The sector optimiser is already integrated with the ASM LARA system and future plans exist to allow it to communicate with controller working positions.

To maximise efficiency, it is fully integrated with the TimeZone manpower planning tool developed at MUAC. The user-friendly interface offers bar graphs which are fully configurable and integrated with a geographical display of expected traffic flows and flight lists. The tool also displays an overview of the weather situation at major airports and is capable of accessing real-time information (European Airspace Use Plan/European Updated Airspace Use Plan (EAUP/EUUP) and regulations available in the Network Manager's systems via B2B web services. The iFMP integrates new ideas and concepts being explored under the SESAR programme in the area of Flow and Complexity Management, and serves as MUAC's validation platform in these areas. On 11 April 2016, having achieved Final Operational Capability (FOC), it became the primary ATFCM decision-making tool for MUAC Central Supervisory Suite (CSS) staff. The previous system, supplied by the EUROCONTROL Network Manager (CHMI – Collaboration Human-Machine Interface), will still be available in the operations room as a back-up.

Radio Direction Finder System (RDFS)

The Radio Direction Finder System (RDFS) locates aircraft based on radio transmissions, by deploying a set of state-of-the-art radio direction finders, developing triangulation software to accurately calculate the position of an aircraft during transmissions on the sector frequency and finally by providing a visual display of this information on the controller's integrated HMI (Human Machine Interface). The activities carried out in 2014 concentrated on the preparation and subsequent launch of the call for tenders for the RDF equipment and the associated installation/connectivity tasks. The contract was signed on 4 May 2015. The RDFS, which is financed by the Innovation and Networks Executive Agency (INEA), is planned to commence operations in the MUAC OPS room by the end of 2016.

New management information tools in support of the 2.0 management system

It is absolutely vital for MUAC to continuously enhance operational performance, fine-tune management processes and improve organisational transparency in order to respond to the pressures originating from, amongst other things, the EU performance scheme, continued FABEC development and the constant evolution of the airline industry. Throughout 2015, the development of the integrated ISO-compliant 2.0 management system continued together with its associated processes, procedures and a new portfolio of management information tools. These tools include a central project intelligence database, associated BI (business intelligence) reporting tools along with an information board. The toolset was progressively rolled out over the course of 2015 providing support for newly established processes, most significantly change management, as well as strategy and priority management.

FABEC – DSNA and MUAC jointly procure Voice Communication System

The new-generation Voice Communications System (VCS), which was launched in 2011 following the signing of a contract between MUAC, the French Direction des Services de la Navigation Aérienne (DSNA) and equipment supplier Frequentis, will be deployed at MUAC as of 17 October 2016 and, in the following years, across French air traffic control facilities. Notably, the VCS will incorporate a baseline for dynamic and flexible operational concepts supporting remote users and involving multiple centres. Its primary function is to maintain safe controller-pilot and controller-controller voice communications. As part of this project, improvements to the VCS integration with the controller's HMI will be implemented. The VCS system is financed by the Innovation and Networks Executive Agency (INEA).

Air Ground Data Link in operation since 2003

Over the 2015 business cycle, MUAC continued work, under challenging conditions, to ensure that airline operators were provided with the best possible data link services as defined in the Data Link Services Implementing Rule for ANSPs as well as Future Air Navigation System (FANS) 1/A services.

Controller-Pilot Data Link (CPDLC) operations via the aeronautical telecommunications network (ATN) continued to experience issues impacting the robustness of airborne equipment which was affected differently depending on the communication service provision infrastructure. Following successful avionics filtering, significantly lower levels of communication drop-outs also referred to as 'provider aborts' (less than 5%) were noted at the end of the year.

MUAC is in the process of re-establishing confidence in the system in light of the significant benefits it undoubtedly delivers. Data link communications in the MUAC airspace have been steadily increasing over recent years, and in 2015, an average of 350 daily data link messages were exchanged with more than 100 participating airlines. MUAC strongly believes in the potential of CPDLC to elevate traffic peaks during the busy summer period and hopes that the remaining technical problems will be resolved through cooperation with our partners, allowing this technology to deliver its full benefits in the course of 2016.

'ATM Data as a Service' (ADaaS) study between MUAC and Slovenia Control

The ADaaS project is a study being conducted by MUAC and Slovenia Control, to investigate how ATM Data Services can be provided by an interoperable and harmonised ATM system (the ADSP – ATM Data Service Provider) to one or more civil Air Traffic Service Units (ATSUs).

The project, which is being co-financed by the European Union's Connecting Europe Facility (CEF) with a € 2.45 M contribution, will be monitored by the Innovation and Networks Executive Agency (INEA).

The first part of the study will develop and deploy a prototype system to support the provision of ATM data in an operational ATM environment from a single ADSP to one or more civil Air Traffic Service Units (ATSUs). The study will also concentrate on how an existing ANSP's ICT infrastructure should be upgraded to receive data from an ADSP. Next, the impact of the changes for main ATM systems (CWP – Controller Working Position, and FDPS – Flight Data Processing System) of the involved ADSP and ATSP will be investigated. The concept, when implemented, will introduce new services and lead to increased interoperability.

The overall objective is to collect all the necessary information to enhance higher degrees of efficiency and mitigate the general defragmentation of European ATM systems. Once this has been achieved, it will be possible to calculate the potential cost-benefit advantages for the concerned ANSPs. Further implementation by other European ANSPs will follow, making ADaaS an additional proof-of-concept for SESAR's "Virtual Centre" vision.

Rationalisation of IT Infrastructure

MUAC is in the process of reducing the hardware footprint of its technical systems. In terms of the operational systems, after a first deployment of hardware virtualisation in 2012, MUAC migrated the Primary ARTAS/STCA/ARTDACO subsystems and the FDPS subsystem (the latter from SOLARIS) to KVM virtualised INTEL servers.

The key benefits of these projects include a reduction in the total cost of hardware ownership, a virtualisation of competencies to be retained by MUAC staff, improved maintainability, increased flexibility for project support and last, but not least, a strong reduction in future infrastructure renewals.

Milestones/Deliverables 2016

The Super Role Allocation Tool (SRAT) will make it possible to monitor and configure the roles and sectorisation of all subsystems of both the primary and fall-back ATS and voice communication systems.

By replacing the current laborious and error-prone configuration of the different ATS and voice communication systems, SRAT will provide additional support for supervisors in their daily operations. Most significantly, it will also improve safety by eliminating the inconsistencies between all these systems.

The SRAT for the Primary ATS system was implemented on 2 June 2016 while SRAT for the Primary Voice system will follow the introduction of NVCS later in 2016. The implementation of SRAT in the fall-back systems (extended scope) will be assessed thereafter. If the go-ahead is confirmed, it will be planned for implementation during 2017.

SESAR Deployment Phase

MUAC collaborates with the other FABEC partners on the projects needed to satisfy the PCP (Pilot Common Project) mandates which have due dates running up to January 2025. As part of FABEC, MUAC is involved in the SESAR Deployment Manager - SESAR Consultation Platform – Steering Group (SCP-SG) as well as Thematic Sub-Groups (SCP-TS) for which the relevant topics are re-assessed each cycle.

Initially, MUAC proposed the FABEC Free Route and XMAN projects as the first PCP Deployment-related implementations under the INEA Call for Proposal (CfP) 2014, but both were rejected because of the ongoing FABEC infringement procedure. However, these two projects were reworked and reinitiated for the INEA CfP 2015 for which the decision is expected in the course of 2016.

MUAC (as part of FABEC) remains involved in the Deployment Plan (DP) update which is typically undertaken annually. Among other things, the DP also defines the scope for new projects in the upcoming INEA CfP (also referred to as Connecting Europe Facility – CEF) calls. The main projects are Interoperability air-ground and ground-ground (AF5 and AF6), Network Collaborative Management (AF4), Flexible Airspace Management and Free Route (AF3) and support to the Extended Arrival Manager (AF1).

Both FABEC Free Route and XMAN projects will evolve and deliver up until 2019 at least. Additional projects will be proposed for future INEA CfPs when deemed mature for deployment. For the CEF 2015 call, projects related to the Security Operations Centre (SOC) and new Pan-European Network Services (new PENS) have been introduced as part of EUROCONTROL Brussels programmes and Data Link via a Multi ANSP project.

SESAR validations

MUAC, in cooperation with other ANSPs and industry partners, is contributing to pre-operational validation projects in the context of the SESAR development phase to gain experience with the new concepts and technology as already mandated through the Pilot Common Project (PCP) up till 2024. MUAC will contribute its know-how in areas of interest to the European ATM network where the Centre can deliver added value. As part of the SESAR development phase, MUAC, in line with the SESAR Joint Undertaking policy, will conduct activities in, or close to, the control room focusing on en-route operations, including links to the terminal areas and the Network Manager. Those activities have been regrouped into two main streams:

- Trajectory Management Framework (TMF) which includes:

  – initial 4D (i4D): ground-air interoperability – trajectory synchronisation; and,

  – ground-ground interoperability – first SWIM implementation.

- Flow and Capacity Management (FCM) including:

  – complexity management and Dynamic Demand and capacity balancing;

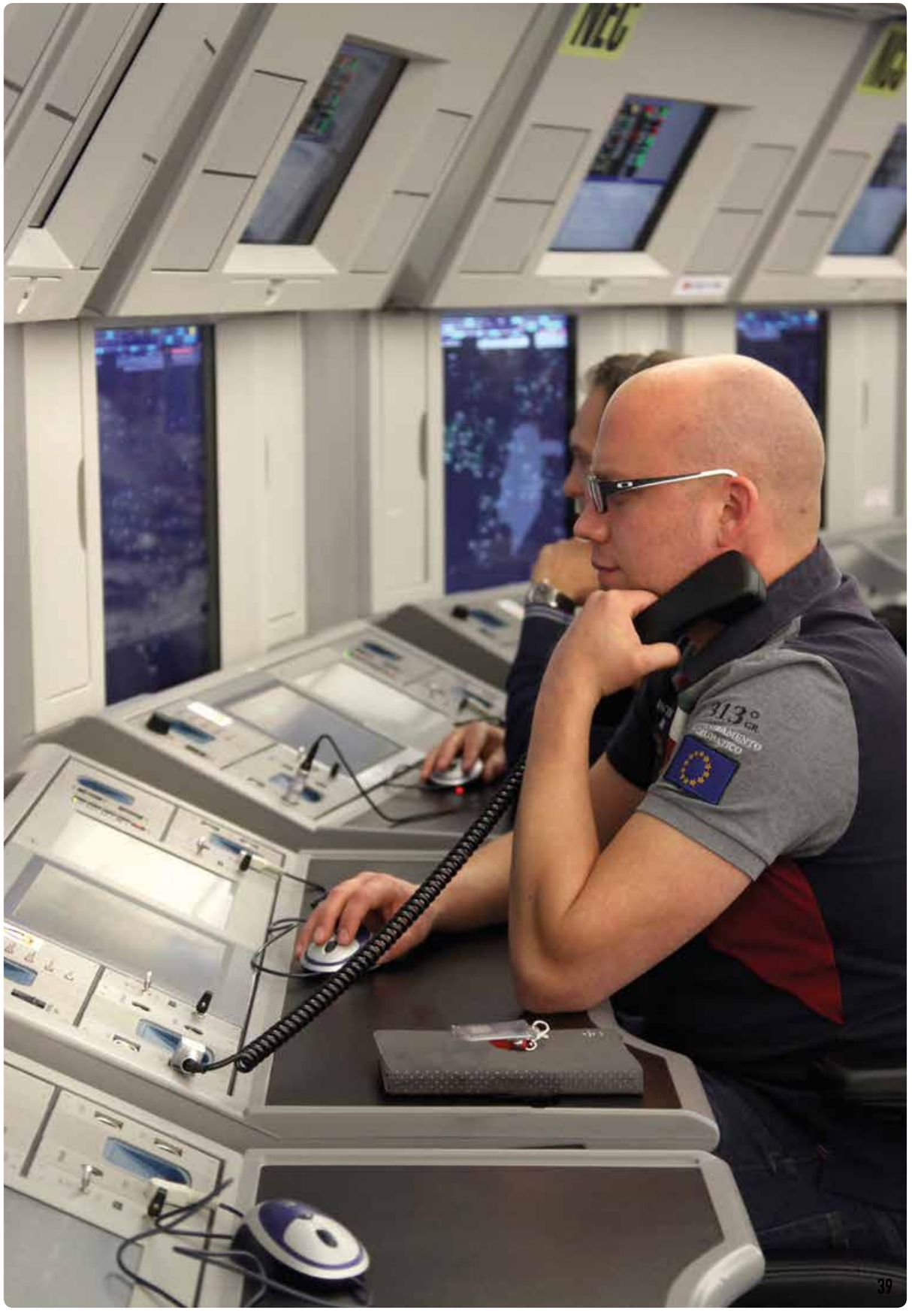
  – airspace management tools (CIVMILCO) and network support; and,

  – the corresponding interactions and interfaces with the NM tools.

MUAC plans to further mature the abovementioned required functionality and systems that have been partially validated under SESAR1. Additional SESAR2020 validations and demonstrations are proposed as part of the SESAR2020 programme to support PCP Deployment.

Under SESAR1, and in the context of the TMF, two exercises were executed in 2015 - one ATC-ATC and one ATC-NM. The results have shown that the migration from OLDI (On-Line Data Interchange) towards the Flight Object (FO) is one of the most complex SESAR subjects, which requires detailed harmonisation not only at the (technical) interface level, but also at the operational concept level. As a result, all the parties involved have assigned additional resources to better prepare the European standard in this area. As for FCM, exercise VP700 (dDCB-STAM using NM B2B services in local tools) was postponed from Q4 2015 to Q1 2016 because the developments were not yet mature enough. However, the intermediate results look promising.

The SESAR2020 bid phase was significantly delayed and was finally closed on 20 April 2016. SESAR2020 is expected to start up their detailed definition phase as from Q4 2016.



Over the reporting period, the number of employees decreased by 1.8% from 624 in 2014 to 613 in 2015, despite a slight increase of Air Traffic Controllers from 305 to 306. High controller outflow expected in the next 10 years, combined with lengthy controller intake procedures and rigidities in the licensing system, pose additional challenges to the achievement of the required level of performance. Nevertheless, the implementation of an integrated and shared information system coupled with an efficient manpower planning policy and an effective customer relationship management strategy is paramount to ensure sustained performance over the SES RP2 period.

A new process-based organisational structure is now fully operative

The new process-based matrix structure became fully operational in 2015. Other significant achievements were ISO 9001:2008 re-certification in December 2015 enabling continued provision of Air Traffic Management, Communications and Surveillance Services which are consistent with international standards, including the procurement, integration and maintenance of technical systems and the provision of ATM specific training.

Agile manpower planning

Manpower requirement is continuously being monitored with regards to both the controller and support functions.

MUAC manpower requirement saw sustained growth in traffic demand over the reporting period. To actively prepare for the expected retirement of a significant number of Air Traffic Control Officers (ATCOs) in the near future, we have restarted ab initio training.

For the support functions, the objective was to contain, or where possible, lower staff numbers to meet the MCG tasking of assessing the business need for every support function prior to filling it. Therefore, over the reporting period, internal solutions were pursued instead of external recruitment and outsourcing contracts were awarded wherever possible to focus MUAC resources on core activities.

Overall staff numbers went down by 11 full-time equivalent (FTE) employees – equating to 1.8% of the previous year's staff complement.

Ab Initio Training at ENAC

In May 2015, eight new recruits started their initial training at ENAC in Toulouse. In October, all students successfully finished basic training, based on the European Common Core Content training for ATCOs. The cooperation between the MUAC Training & Proficiency section and the ENAC ATM Department is excellent. In March 2016, Student ATCO Licences were handed out to all eight students marking a 100% success rate in the initial training. Before joining MUAC for their unit training, successful Student ATCOs will undergo an 11-week 'Pre-Transition Training' period to fill the gap between a standard rating level and the demanding MUAC environment.

Unit Training at MUAC

Throughout 2015 and well into 2016, the 'New Unit Training' Project was amongst the highest priorities in the MUAC's Training and Proficiency Unit's work plan. This training course is based on new learning methods for a new generation of students.

Investment in Coaching Training

Coaching (teaching and instructing) is a professional skill. In the context of the new unit training, a lot of attention is also devoted to support the OJTIs (On-the-Job Training Instructors) in further development of their coaching skills. Consequently, an OJTI training course is under development with expert input from TNO, which is planned to be ready for delivery in early 2016.

Cross Training Programme

In order to balance staff availability between the three MUAC sector groups, a 'Cross Training Programme' was developed and eight ATCOs have been trained to obtain an additional geographical endorsement in the Brussels sector group. Plans exist for an additional training course in 2016 with four ATCOs.

Social Dialogue

Social dialogue activities in 2015 continued at both Agency and MUAC levels through the Agency consultation process involving the trade unions and meetings of the Staff Committee Servants with senior management.

At Agency level, 2015 saw a focus on the Administrative Reform which was agreed with the social partners in June and entered into force on 1 July 2016. The Reform follows the principles agreed at the EU and aligns the Agency's employment regulations with those of the EU to a large degree. Deviations or specifications are made where the EU provisions would not fit the needs of an operational centre such as MUAC, seeing that the EU is largely an administrative organisation.

Within MUAC, the management provided regular feedback to the Staff Committee Servants on MUAC's activities and its involvement within FABEC. A specific focus was on the decisions taken in PC#44 (44th Provisional Council meeting) in December 2015, namely the reallocation of HQ support costs from all 41 States to the four MUAC States and the mandates for MUAC to provide air traffic services to military traffic in the Hannover UIR and the upper airspace of the Amsterdam FIR in the future. They also followed up on staff concerns raised by the Staff Committee.

Gender distribution (31 December 2015)

Female employees

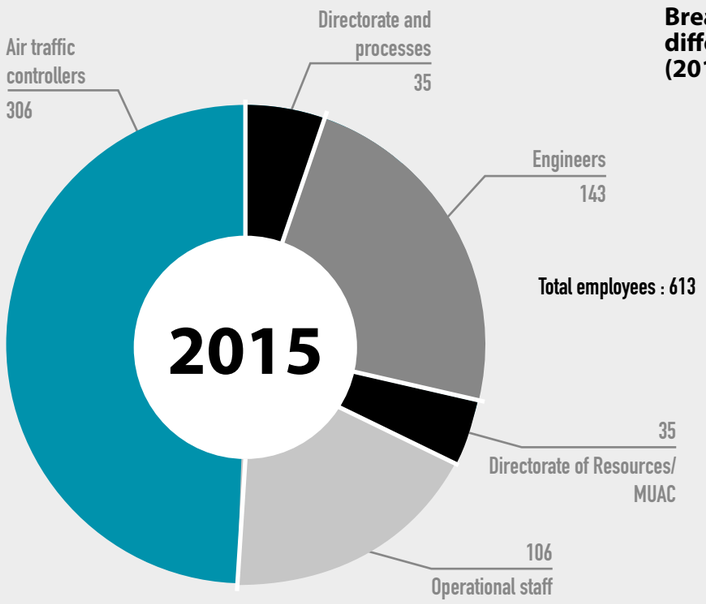
115 = 19 %

Male employees

498 = 81 %

Staffing trends 2011 – 2015

31 December 2015	
Breakdown of staff in the different core business units	
Directorate and processes	35
Operational staff	106
Air traffic controllers	306
Engineering	143
Directorate of Resources/MUAC	23
TOTAL	**613**



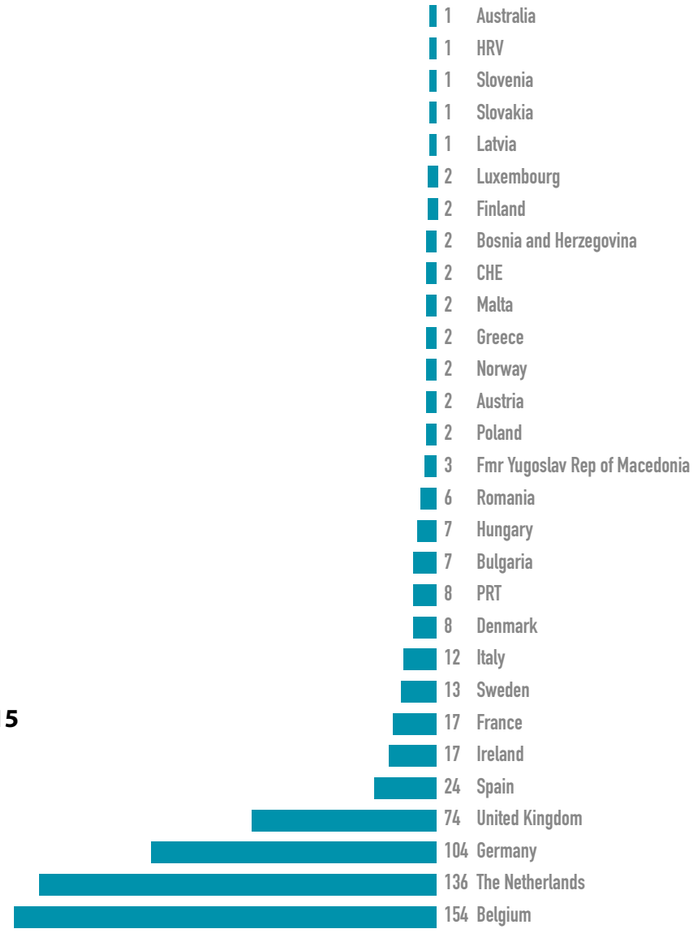
Breakdown of staff in the different core business units (2015)

31 December 2015	2011	2012	2013	2014	2015
Air traffic controllers per sector group					
DECO	84	91	93	97	100
Hannover	103	100	101	101	99
Brussels	103	106	107	107	107
TOTAL	**290**	**297**	**301**	**305**	**306**
Newly qualified air traffic controllers	**10**	**7**	**6**	**9**	**3**
Staff outflow and intake					
Retirements	5	6	14	11	3
Other outflow*	29	14	19	18	18
Total outflow	**34**	**20**	**33**	**29**	**21**
Recruitment (except air traffic controllers)	9	5	6	2	2
Student air traffic controllers (ab initio and conversion)	16	8	0	0	8
Total intake	**25**	**13**	**6**	**2**	**10**

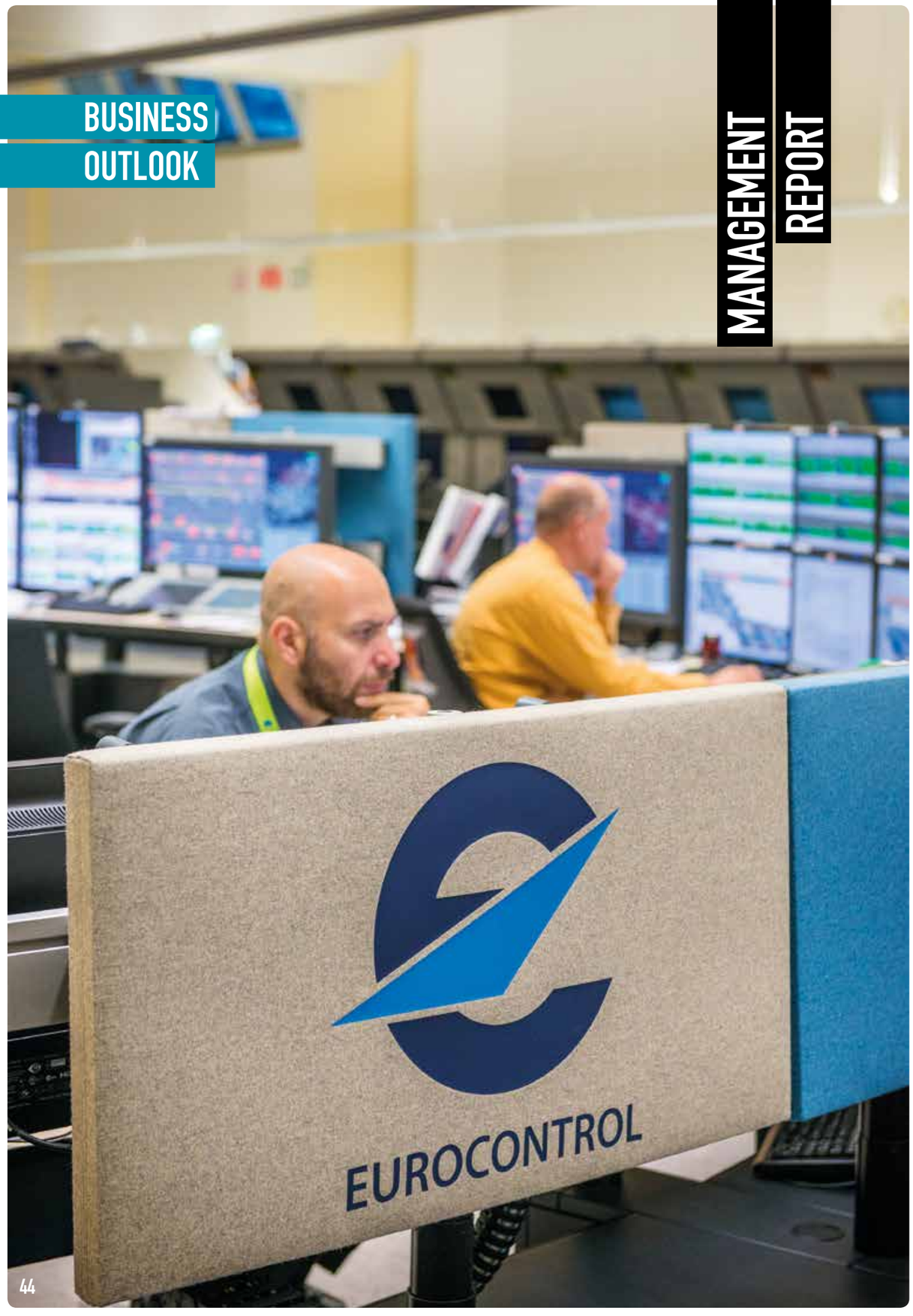
* Other outflow refers to student air traffic controller dismissals, resignations, early terminations of service, transfers to other EUROCONTROL units, unpaid leave, invalidity, end of contract, contract terminations or death in service.

Staff nationalities in 2015

Total 613



BUSINESS OUTLOOK



As business confidence within the Eurozone progressively returns, air traffic growth in the order of 2% is expected in MUAC airspace for 2016. Once again, it is expected that growth will surpass the low scenario of the STATFOR seven-year traffic forecast. Therefore, to guarantee the accuracy of the business planning process, it is more prudent to rely on the STATFOR baseline scenario rather than on the low one. The actual development of traffic will be closely monitored in order to ensure adequate response to, and handling of, the demand.

Current trends indicate an overall stronger-than-expected traffic growth, especially in the German part of the airspace where users appear to have reacted to the lowered unit rate.

Whilst 2015 was a challenging year in terms of successfully coping with the unbalanced and unforecasted demand, it is expected that 2016 and the years beyond will be even more challenging. This will undoubtedly necessitate a high level of initiative and resourcefulness in all areas of the business to achieve the same high level of success.

To help accommodate the increased traffic demand, numerous programmes at operational, technical, human resources and managerial levels are being developed and implemented. The benefits of these initiatives will be regularly assessed with regards to the performance benefits each one may bring.

Innovative approaches are being developed to investigate and establish solutions to the problems of limited extensibility of the existing ATC methodology as well as to optimise the pre-tactical process.

From the controller resources perspective, and taking into account the duration of the controller training programme as well as the expected outflow to pension (ie retirement) in the coming years, it is essential that the appropriate recruitment measures are maintained in order to ensure that sufficient qualified staff are in place to meet future traffic demand. As well as detrimental effects on the network, any degradation in MUAC's capacity and delay performance would inevitably result in reduced revenue. Meanwhile, further optimisation of the MUAC concept of operations will aim to make more efficient use of the reduced controller resources.

With some of the key FABEC airspace design projects suspended it is clear that at least in the short to medium term, MUAC will not be able to rely on FABEC support in solving the main structural issues at hand. MUAC will instead, either independently or in bi-lateral cooperation with selected partners, address the challenges in order to deliver the required capacity to the network. The FABEC Free Route Airspace will however remain a flagship activity in order to continue the delivery of notable benefits to airspace users. The improvement of horizontal and vertical flight efficiency will be carried out jointly between FABEC partners and airspace users.

In the course of 2016, additional system enhancements are foreseen which will increase the level of automated systems and processes available to air traffic controllers. The introduction of this supplementary automation will not only raise controller output, it will also enhance overall traffic safety.

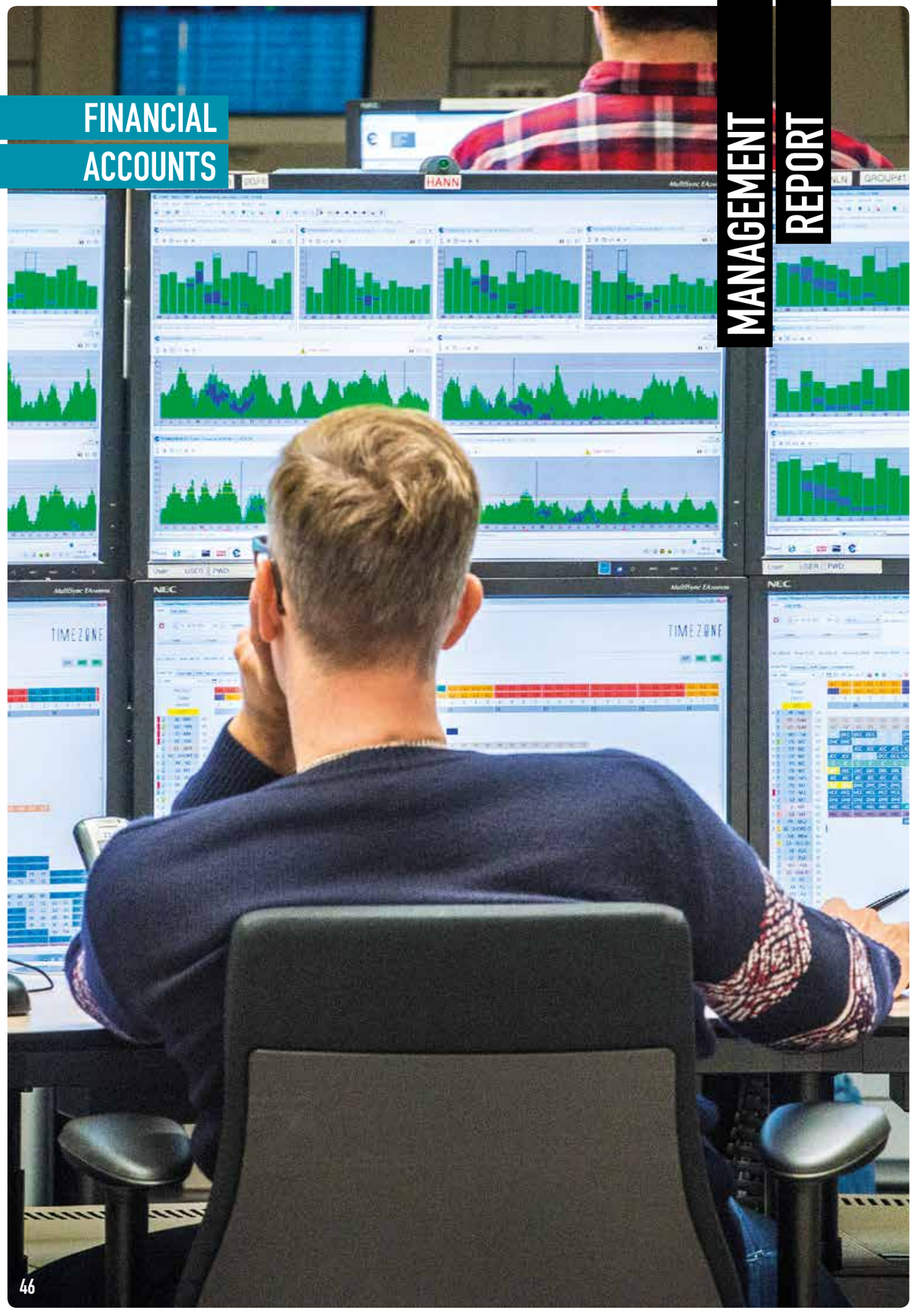
It remains our strategy to establish the most efficient civil/military working relationships with our military partners in the Four States. To this end, the full integration of military services in the Hannover UIR plays an important role in developing a sound working platform for further civil/military integration.

As always, cost-efficiency will continue to play an intrinsic role as will investment in key areas to safeguard our pioneering approach to the provision of high-performance air navigation services.

The MUAC Board

FINANCIAL ACCOUNTS

MANAGEMENT REPORT



Annual accounts

EUROCONTROL produces annual accounts which provide a consolidated view of the Agency's financial performance. In line with the applicable financial regulations, the specific performance of MUAC is identified in Part III of the Agency's accounts. This report includes an excerpt of the data available in the Agency's Annual Accounts in order to present a reference Balance Sheet and Statement of Financial Performance for MUAC. The Agency's Annual Accounts are produced in accordance with the principle of a true and fair view.

The Agency's accounts, including Part III, which relates to MUAC, are audited by the Audit Board with the assistance of external consultant auditors. The Annual Accounts, including the auditor's opinion, are subsequently submitted to the Commission via the Provisional Council. The Commission gives a final ruling on the Accounts and decides on the discharge to be given to the Director General in respect of his financial and accounting management.

The figures presented in this report are, therefore, subject to the approval of the Audit Board and the Provisional Council, which was received in June 2016.

Accounting principles and general notes on accounting matters

The main accounting principles, underlying the present financial statements, are set out below.

Since 2011, the financial statements with regard to expenditure and receipts are prepared on the basis of the International Financial Reporting Standards (IFRS), and based on the provisions of the Financial Regulations of the Agency and their Rules of Application.

The Agency's policy, regarding fixed assets, is based on the revised Director General Decision XI/7(2011), dated 17/10/2011 and the Principal Director Resources Decision DR/II/07 (2013). Fixed assets are entered at their historic value and amortised over their useful lifetimes, in accordance with amortisation rates, which apply equally to the calculation of the investment costs to be recovered from the airspace users through the EUROCONTROL part of the cost-base (based on ICAO rules adopted by the Permanent Commission).

Following a decision by the Provisional Council in November 2004, the Agency applies IAS 38 and, as of 1 January 2006, capitalises only intangible assets that fully comply with this standard. Following this principle, only computer software for which EUROCONTROL owns intellectual property rights are capitalised.

Concerning operating expenditure, contributions from the Four Member States participating in MUAC are calculated on the basis of an agreed cost-sharing formula. At year end, the over/under payment of contributions is calculated by comparing the level of expenditure with the level of contributions paid.

Concerning investments, a mechanism for pre-financing investments by the Agency is in place, ensuring that investments are fully financed with bank loans. Therefore, the residual value of fixed assets in the Balance Sheet is fully compensated by an equivalent amount of loans. In the Statement of Financial Performance, the amortisation charge for the year is balanced by contributions from the Four States.

In accordance with Article 23 of the Financial Regulations, any over/under payments of contributions are deducted from/added to contributions for the subsequent year.

In accordance with Article 29 of the Financial Regulations, and, as approved by the Permanent Commission, the Annual Accounts incorporate both the Budgetary and the Financial Accounts.

The 2015 Budgetary Accounts, which determine the amount of contributions due from the Member States in 2015, are based on the IFRS principles (with some exceptions). Similarly, the 2015 EUROCONTROL cost-base, which has been charged to the users through the route charges recovery cost mechanism, is also based on the IFRS principles (with some exceptions).

The exceptions to IFRS are listed in Article 6 of the Rule of Applications to the Financial Regulations in the areas of contributions to social security schemes, compensations of national taxes and provisions.

BALANCE SHEET (Nominal values)

ASSETS		€ 2014	€ 2015
FIXED ASSETS	Buildings & installations	33,521,622	33,688,739
	Equipment	34,059,333	29,323,931
	Vehicles	0	0
	Work in progress	5,784,798	6,408,052
	TOTAL FIXED ASSETS	73,365,753	69,420,722
CURRENT ASSETS	Contributions to be received	32,590,308	30,763,378
	Intercompany receivables	20,164,729	10,452,957
	Deferred charge	7,624,246	8,339,082
	Other debtors	928,024	597,995
	TOTAL CURRENT ASSETS	61,307,306	50,153,412
	OVERALL TOTAL	**134,673,059**	**119,574,134**
LIABILITIES			
CURRENT LIABILITIES	Contributions to be reimbursed to Member States	12,435,163	15,369,592
	Deferred income	32,375,208	30,671,227
	Other creditors	16,496,935	4,112,593
	TOTAL CURRENT LIABILITIES	61,307,306	50,153,412
OTHER LIABILITIES	Loans > 1 year	73,365,753	69,420,722
	TOTAL OTHER LIABILITIES	73,365,753	69,420,722
FINANCIAL POSITION			
	TOTAL FINANCIAL POSITION	0	0
	OVERALL TOTAL	**134,673,059**	**119,574,134**

STATEMENT OF FINANCIAL PERFORMANCE (Nominal values)

	2014			2015		
INCOME	**GAT**	**OAT**	**Total €**	**GAT**	**OAT**	**Total €**
Member State contributions			126,355,586			123,220,832
Member State contributions PBO			375,000			380,000
Internal Tax			37,318,952			32,560,262
TOTAL INCOME			**164,049,538**			**156,161,094**
COSTS						
Remunerations	-126,536,021	-5,370,165	-131,906,186	-114,998,601	-3,823,947	-118,822,548
Remunerations – accrual budgeting						
Receipts related to remunerations	1,071,033	45,454	1,116,487	1,087,653	36,167	1,123,819
Receipts related to outsourcing Austrocontrol	276,275	11,725	288,000	223,566	7,434	231,000
Receipts related to KLU Project	1,286,267	54,589	1,340,856	628,307	20,893	649,200
Receipts related to sale of services	704,496	29,899	734,395	796,147	26,474	822,621
STAFF COSTS	-123,197,950	-5,228,498	-128,426,448	-112,262,927	-3,732,980	-115,995,908
PENSIONS PBO	-362,257	-12,743	-375,000	-367,771	-12,229	-380,000
Staff-related costs: training and travel costs	-923,819	-39,207	-963,026	-1,356,777	-111,900	-1,468,677
External assistance	-2,213,425	-93,937	-2,307,362	-1,803,297	-148,727	-1,952,024
Accommodation	-3,844,616	-163,165	-4,007,781	-3,312,790	-273,222	-3,586,011
Communications	-1,568,418	-66,563	-1,634,982	-1,554,231	-128,185	-1,682,416
Data processing	-3,659,181	-155,295	-3,814,476	-3,854,725	-317,918	-4,172,642
General administration	-123,237	-5,230	-128,467	-1,479,485	-122,020	-1,601,505
Finance & insurance	-375,995	-15,957	-391,952	-277,829	-22,914	-300,743
Unrecoverable VAT	-7,660	-325	-7,985	-7,654	-631	-8,285
Sale of goods	340	35	375	54,758	5,492	60,250
Miscellaneous receipts	751,722	0	751,722	26,201	2,161	28,361
Miscellaneous receipts – revalorisation buildings						
OPERATING COSTS	-11,964,289	-539,645	-12,503,933	-13,565,828	-1,117,864	-14,683,692
DEPRECIATION COSTS	-9,289,133	-490,494	-9,779,627	-8,797,469	-486,653	-9,284,122
INTEREST PAID	-529,367	0	-529,367	-447,780	0	-447,780
TOTAL COSTS	**-145,342,995**	**-6,271,379**	**-151,614,375**	**-135,441,776**	**-6,271,379**	**-140,791,502**

GLOSSARY OF ACRONYMS

A

Ab Initio	Air Traffic Controller student
ACE	ATM Cost-Effectiveness
ADaaS	ATM Data as a Service
ADSP	ATM Data Service Provider
AFUA	Advanced Flexible Use of Airspace
ANA	Administration de la navigation aérienne (Luxembourg)
ANSP	Air Navigation Service Provider
AoR	Area of Responsibility
ARN	European ATS Route Network
ASM	Airspace Management
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATC2ATM	Air Traffic Control to Air Traffic Management
ATFCM/ASM	Air Traffic Flow and Capacity Management/Airspace Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATM/CNS	Air Traffic Management/Communications, Navigation and Surveillance
ATM-SE	Air Traffic Management Specific Technical Events
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services

B

BAF	Bundesaufsichtsamt für Flugsicherung/ Federal Supervisory Authority for Air Navigation Services
BI	Business Intelligence
BSA-ANS	Belgian Supervisory Authority for Air Navigation Services
B2B	Business-to-business

C

CAA	Civil Aviation Authority
CBA	Cross-Border Area
CDM	Collaborative Decision Making
CEF	Connecting Europe Facility
CNS	Communications, Navigation & Surveillance
CO_2	Carbon dioxide
CONOPS	Concept of Operations Document
CPDLC	Controller-Pilot Data Link Communications
CSS	Central Supervisory Section
CWP	Controller Working Position

D

dDCB	Dynamic Demand and Capacity Balancing
DECEA	Brazilian Department of Airspace Control
DFS	Deutsche Flugsicherung
DSNA	Direction des services de la navigation aérienne

E

EAUP/EUUP	European Airspace Use Plan/European Updated Airspace Use Plan
EC	European Commission
ECAC	European Civil Aviation Conference
EEC	The EUROCONTROL Experimental Centre
EGLL	London Heathrow Airport
ELFAA	The European Low Fares Airline Association
ENAC	Ecole Nationale de l'Aviation Civile
ERNIP	European Route Network Improvement Plan
EU	European Union

F

FABEC	Functional Airspace Block Europe Central
FANS	Future Air Navigation System
FCM	Flow and Capacity Management
FDPS	Flight Data Processing System
FIR	Flight Information Region
FL	Flight level
FO	Flight Object
FOCS	Flow Optimisation Concept Scenario
FRA	Free Route Airspace
FRAM	Free Route Airspace Maastricht
FRAMaK	Free Route Airspace Maastricht and Karlsruhe
FTE	Full-Time Equivalent
FUA	Flexible Use of Airspace

G

GAT	General Air Traffic

H

HMI	Human Machine Interface
HQ	Headquarters

I

IAS	International Accounting Standards
IBP	Industry Based Platform
ICAO	International Civil Aviation Organization
iFMP	Integrated Flow Management Position
IFR	Instrumental Flight Rules
IFRS	International Financial Reporting Standards
ILT	Inspectie Leefomgeving en Transport / Human Environment and Transport Inspectorate
INEA	Innovation and Networks Executive Agency
IOP	Interoperability Programme
ISO	International Organization for Standardization
iStream	Integrated SESAR Trials for Enhanced Arrival Management
i4D	Initial Four-Dimensional

K

KEA	Horizontal en-route flight efficiency of actual trajectory
KEP	Horizontal en-route flight efficiency of the last filed flight
KPA	Key Performance Area
KPI	key Performance Indicator
kWh	Kilowatt hour
KLU	Koninklijke Luchtmacht

L

LARA	Local and Regional Airspace
LVNL	Luchtverkeersleiding Nederland
LARA BE	Local and Regional Airspace Belgium
LARA NL	Local and Regional Airspace Netherlands

M

MARS	Maastricht Airspace Re-structuring
MCG	Maastricht Co-ordination Group
MO	Management Objectives
MUAC	EUROCONTROL Maastricht Upper Area Control Centre

N

NATO	North Atlantic Treaty Organization
NATS	National Air Traffic Services
NEST	Network Strategic Tool
NM	Nautical Miles Network Manager
NOP	Network Operations Portal
NSA	National Supervisory Authority
NSRFG	North Sea Regional Focus Group
NVCS	New Voice Communication System

O

OAT	Operational Air Traffic
OJTI	On-the-Job Training Instructor
OLDI	On-Line Data Interchange

P

PBO	Projected Benefit Obligations
PC	Provisional Council of EUROCONTROL
PCP	Pilot Common Projects
PEGASE	Providing Effective Ground & Air Data Sharing via Extended Project Profile (EPP)
PENS	Pan-European Network Services
PRB	Performance Review Body

R

RAT	Risk Analysis Tool
RDF	Radio Direction Finder
RDFS	Radio Direction Finder System
REDES	Route Efficiency in approaching DEStination
RESTR	Route Efficiency in Straightness of TRajectory
RNDSG	Route Network Development Sub-Group
RP1	Reference Period 1 (2012-2014)
RP2	Reference Period 2 (2015-2019)
RTS	Real Time Simulation

S

SAS	Shared ATS System
SCP-SG	SESAR Consultation Platform – Steering Group
SCP-TS	SESAR Consultation Platform – Thematic Sub-Groups
SES	Single European Sky
SESAR	Single European Sky ATM Research
SMART	Solution for Mutual ATCO en-Route Training
SMI	Separation Minima Infringements
SMS	Safety Management System
SOC	Security Operations Centre
SQS	Safety & Quality Systems
SRAT	Super Role Allocation Tool
STAM	Short-Term ATFM Measures
STANLY-ACOS	STANLY Airspace Coordination System
STATFOR	EUROCONTROL Statistics and Forecast Service
SU	Service Unit
SWAP	FABEC Implementation Project South-East
SWIM	System-Wide Information Management

T

TMF	Trajectory Management Framework
TNO	The Netherlands Organisation for Applied Scientific Research
TRA	Temporary Reserved Area
TSA	Temporary Segregated Area
TEN-T	Trans-European Network

U

UAC	Upper Area Control Centre
UIR	Upper Information Region
UNL	Unlimited

V

VAT	Value Added Tax
VCS	Voice Communications System
vDFL	Variable Division Flight Level

X

XMAN	Cross-Border Arrival Management

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