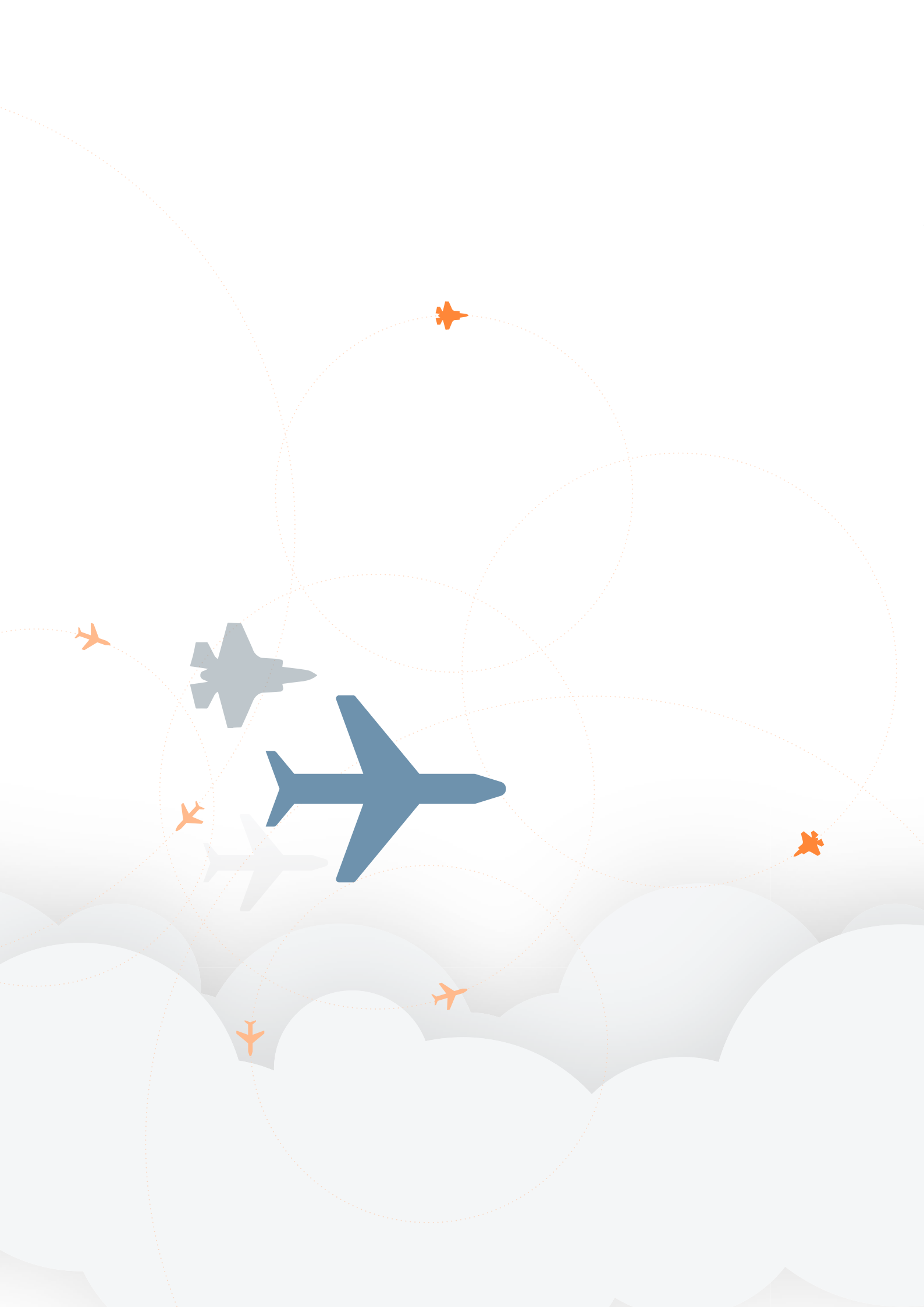
EUROCONTROL

EUROCONTROL MAASTRICHT UPPER AREA CONTROL CENTRE ANNUAL REPORT 2021

PERFORMANCE THROUGH INNOVATION



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FAST FACTS

MUAC Performance Indicators (M€ - €2021)	2017	2018	2019	2020	2021	2021 ↔ 2020
TRAFFIC						
Movements	1,848,581	1,872,686	1,862,754	832,888	936,360	+12.4%
IFR flight-hours	645,062	667,869	667,596	289,992	311,836	+7.5%
Service Units	7,366,791	7,659,462	7,600,610	3,387,935	3,638,592	+7.4%
Sector Opening Times (SOTs) – (hours)	77,159	75,275	71,219	43,692	46,350	+6.1%
Traffic peak (number of flights controlled per day)	5,689	5,702	5,670	4,668	3,961	-15.1%
Average flights controlled per day	4,831	4,903	4,851	2,132	2,404	+12.7%
Average flights controlled in summer (May-October) per day	5,307	5,342	5,259	1,831	2,848	+55.6%
STAFF						
MUAC staff (excluding former Lippe staff)	639	681	699	755	767	+1.6%
Former Lippe staff	48	47	-	-	-	-
ATCOs in OPS	302	303	300	299	306	+2.3%
ATCOs in OPS (FTEs)	266	259	255	229	215	-6.1%
COST-EFFICIENCY (€2021) [1]						
Inflation rate (Netherlands)	+1.3%	+1.6%	+2.7%	+1.1%	+2.8%	
Revenues (€M)	€525.1	€510	€479.8	€240.7	€272.0	
Capital expenditure for the year (€M)	€5.1	€6.9	€7.6	€4.5	€6.0	
Total fixed assets at year end (net book value; €M) [2]	€64.6	€60.9	€56.3	€51	€50.8	
Cost-base (€M)	€149.5	€156.6	€170.7	€189.4	€188.1	
Staff costs	€122.1	€125.3	€137.6	€157.3	€159.9	
Non-staff operating costs	€19.1	€21.8	€23	€22.9	€22.2	
Depreciation	€8.1	€9.3	€9.9	€9.1	€5.9	
Cost of capital	€0.2	€0.2	€0.2	€0.1	€0.2	
Total financial cost/flight-hour [3]	€244	€243	€258	€653	€603	
Total economic cost/flight hour [4]	€446	€478	€309	€657	€605	
MUAC equivalent unit rate [5]	€21.3	€21.1	€22.7	€55.9	€51.7	

MUAC Performance Indicators (M€ - €2021)	2017	2018	2019	2020	2021	2021 ↔ 2020
CAPACITY						
Productivity	2.06	2.22	2.23	1.29	1.52	+17.4%
Total delay (min.) [6]	1,232,634	1,482,997	320,571	10,839	4,013	-62.9%
CRSTMP delay (min.) [7]	803,384	927,974	181,387	8,568	3,450	-59.7%
Average total delay/flight (min.)	0.67	0.79	0.17	0.01	0.004	-60.0%
Average CRSTMP delay/flight (min.)	0.43	0.50	0.10	0.01	0.004	-60.0%
Punctuality (%)	95.5%	95.4%	98.8%	99.9%	99.9%	-
Delayed flights (%)	4.5%	4.6%	1.2%	0.1%	0.1%	-
Delayed flights (WO codes, %)	1.1%	1.2%	0.4%	0%	0.0%	-
Delayed flights (CRSTMP codes, %)	3.5%	3.3%	0.8%	0.1%	0.1%	-
Flights with 1-15 min. of delay (CRSTMP codes, %) [8]	2.5%	2.1%	0.6%	0.1%	0%	-
Flights with 16-30 min. of delay (CRSTMP codes, %)	0.8%	0.9%	0.2%	0%	0%	-
Flights with +30 min. of delay (CRSTMP codes, %)	0.2%	0.3%	0%	0%	0%	-
Congested days (min. delay > traffic)	59	90	13	0	0	-
SAFETY						
Separation infringements (MUAC contribution)	2	3	0	2	0	-
ENVIRONMENT						
Flown RESTR	0.45%	0.47%	0.47%	0.38%	0.62%	-

(1) Cost-efficiency indicators are calculated on the cost-base.

(2) Total fixed assets, including work in progress

(3) Total financial cost per flight-hour: ATM/CNS service provision cost per IFR flight-hour

(4) Total economic cost per IFR 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 IFR flight-hour. This indicator enables the trade-offs between cost and capacity performance to be measured.

(5) The key performance indicator for cost-effectiveness defined in the Single European Sky (SES) II Performance Regulation is the unit cost. Since the unit cost is calculated on the basis of consolidated costs and production at national level, the concept of a MUAC equivalent unit cost 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) Minutes of delay allocated to MUAC following an adjustment and reallocation of en-route ATFM delay by the NM

(7) C-ATC Capacity, R-ATC Routeings, S-ATC Staffing, T-ATC Equipment, M-Airspace Management and P-Special event delay

(8) Flights with less than 1 minute of delay are excluded

MUAC PROFILE

The Maastricht Upper Area Control Centre (MUAC) is an international non-profit civil-military integrated air navigation service provider, operated by EUROCONTROL on behalf of the 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, at both civil and military levels, 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 adding value for the network.

Consolidating airspace across national borders

For nearly 50 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.

From 1975 to 2017, German controllers from Lippe Radar provided military air traffic control in the Hannover Upper Information Region (UIR) –– the upper airspace (above 24,500 feet) of north-west Germany –– from the premises of MUAC. On 1 January 2017, Lippe Radar was integrated into MUAC, laying the foundations for fully integrated civil-military air traffic management.

Since April 2017, military traffic in the upper airspace of the Amsterdam Flight Information Region (FIR) has also been handled by MUAC controllers. With this development, MUAC became the first cross-border civil-military ANS provider in Europe.

On 22 December 2016, EUROCONTROL and the Belgian Ministry of Defence signed an agreement for the provision, by MUAC, of air traffic control data services to the Belgian Air Defence. The shared ATS system became operational in 2019 at the air traffic control centre (ATCC) for en-route military operations and at the ATC towers in Beauvechain, Florennes, Kleine-Brogel and Koksijde for approach and tower operations.

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 lead the way by providing safe and efficient cross-border ATM services to all airspace users while developing and integrating cutting-edge systems and services with our partners.

MUAC's vision

- MUAC is a leading innovator recognised for its outstanding ATM operations and data services which set the standard for the industry.
- MUAC provides its ATM services and systems to airspace users, the Network Manager and ANSPs.
- As a leading innovator, MUAC is a strategic partner of choice.

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 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.

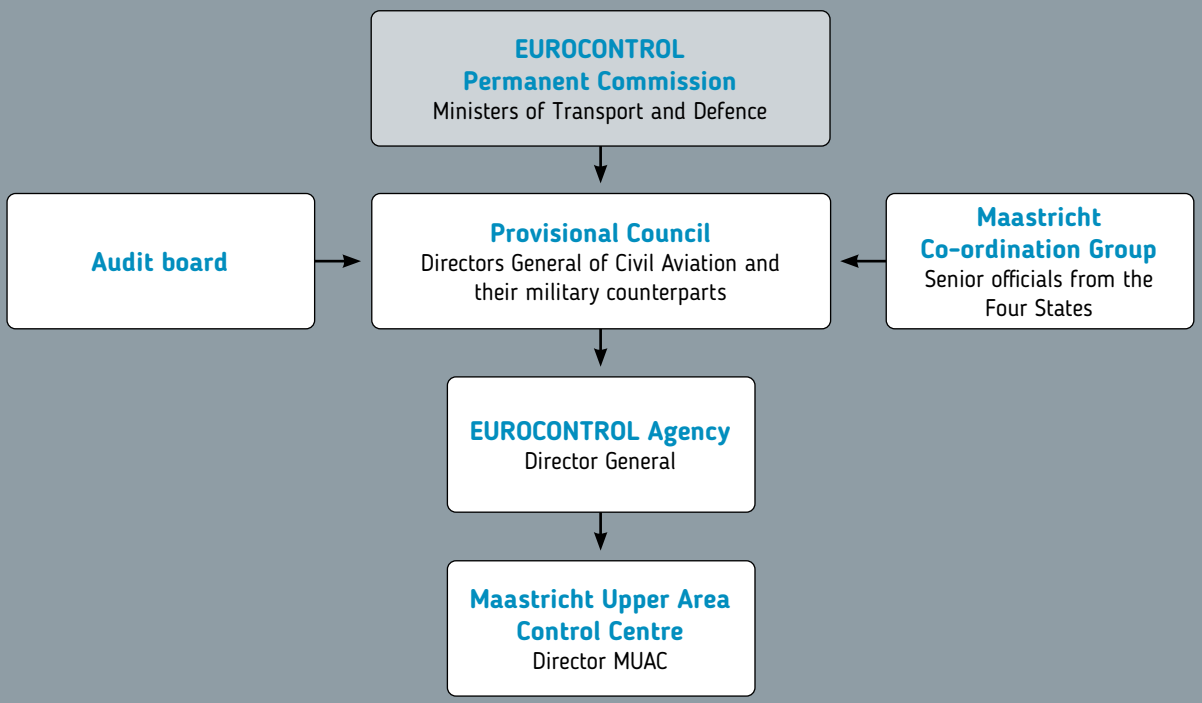
OVER 17% OF ALL EUROPEAN FLIGHTS USE MUAC'S AIRSPACE (PRE-COVID FIGURES)

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 provided in accordance with the national regulations in force in the respective territories and airspaces concerned.

The Maastricht Coordination 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' National Supervisory Authorities (4NSAs). In 2017, military regulations expanded the scope of applicable regulations.

Supervision and oversight

Following 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 established National Supervisory Authorities (NSAs). In Belgium, the NSA 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 Water Management.

The 4NSAs have created two bodies to support the oversight of MUAC: the NSA Committee, representing all four NSAs, having a coordination and advisory role for the relevant national decision-making authorities on oversight matters, and the Common Supervisory Team, composed of personnel from the cooperating NSAs, who have an executive role in conducting document examinations, audits and inspections. The Dutch Military Aviation Authorities (MAA) oversee MUAC as an ANSP for military traffic and as a training organisation for air traffic controllers (ATCOs).

The oversight of service provision to Germany for military traffic is provided by the 4NSA committee, which includes the BAF (Germany) and is supported where needed by the German MAA.

Designation of MUAC as an air traffic service provider

In accordance with Article 8 of 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 for the provision of training to certify the roles of on-the-job training instructors, competence examiners and/or competence assessors for the delivery of air traffic services. This certificate was updated in 2011 pursuant to Commission Regulation (EU) No 805/2011. In 2016, MUAC received an updated certificate as a Training Organisation, demonstrating compliance to Regulation (EU) 2015/340.

In 2015 MUAC was certified as provider of Communication and Surveillance Services by the Dutch NSA.

MUAC has, since 1 January 2017, been accredited to provide ATC to the German Air Force. In 2017, MUAC was also accredited by the Dutch MAA to provide ATC to the Royal Netherlands Air Force (RNLAF).

ISO 9001 certificate

An important milestone in 2018 was MUAC's certification in September/October by DNV GL (Det Norske Veritas Germanischer Lloyd) to ISO 9001:2015 standard.

In order to be certified, the organisation must demonstrate that it has implemented quality management requirements for all areas of the organisation, ranging from people and training to services and infrastructure. MUAC's compliance with ISO 9001 is a key priority, since it is a prerequisite for meeting the requirements of the Single European Sky.

Furthermore, the ISO 9001:2015 certificate is a mark of quality for external and internal stakeholders and functions as Acceptable Means of Compliance (AMC) when it comes to meeting the quality elements of the EU common requirements 2017/373 for ANSPs, applicable as from 2 January 2020.

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) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controller licences and certificates pursuant to the new Basic Regulation (EC) No 2018/1139 of the European Parliament and of the Council. The certificate was issued by BSA-ANS on 13 December 2016.

MUAC ATCOs provide ATC services to OAT in the HAN UIR and AMS FIR above FL245 based on the privileges granted by the Bundesaufsichtsamt für Flugsicherung and the Militaire Luchtvaart Authoriteit respectively. ATCOs are issued with an en-route OAT Certificate of Competence (CoC) or with a Full OAT CoC depending on the type of military traffic they are tasked to handled.

Enterprise risk management

MUAC continuously strives to improve its risk management processes and all business risks are reviewed on the basis of how they affect the achievement of MUAC's strategic objectives.

The business risk management process is aligned with the Agency risk management process and facilitates risk identification and monitoring. Risks, which are assessed as affecting the achievement of MUAC's business objectives, are registered and maintained in MUAC's corporate risk register. Each risk identified requires a mitigating action, reducing the probability of the risk materialising and/or its impact.

MUAC's risk register is updated every quarter on the basis of assessments by the MUAC Risk Management Group. Risks which are escalated to Agency level are shared and discussed with the Agency Risk Management Group on a quarterly basis, consolidated in the Agency Risk Register and tabled for discussion at subsequent Agency Board Meetings.

MAASTRICHT COORDINATION GROUP

Belgium

Head of Delegation

Mr Koen MILIS
Federal Public Service for Mobility and Transport
Chair of the Maastricht Coordination Group during 2021

Other participants

Mr Patrick VANHEYSTE
Federal Public Service for Mobility and Transport

Mr Theo NSENGIMANA
Belgian Civil Aviation Authority

Lt. Col. Ms Nancy LESIRE
Belgian Armed Forces – Air Component

Ms Peggy DEVESTEL
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Belgian Civil Aviation Authority

Germany

Head of Delegation

Mr Dirk NITSCHKE
Federal Ministry of Transport and Digital Infrastructure

Other participants

Mr M. LOKAY
Federal Ministry of Transport and Digital Infrastructure

Ms Bernadette KING
Federal Ministry of Transport and Digital Infrastructure

Lt. Col. Andreas HABRUNNER
Federal Ministry of Defence

Lt. Col. Rene BANSEMER
German Air Force Air Operations Command

Luxembourg

Head of Delegation

Mr Pierre JAEGER
Director General of Civil Aviation

Other participants

Ms Maria DEC
Directorate of Civil Aviation Luxembourg

Netherlands

Head of Delegation

Ms Marjan van GIEZEN
Ministry of Infrastructure and Environment

Other participants

Mr Eric DE VRIES
Ministry of Infrastructure and Environment

Mr Ference VAN HAM
Ministry of Infrastructure and Environment
Chair of the BFWG-4 during 2021

Lt. Col. Gert Jan VAN KRALINGEN
Ministry of Defence

Mr Jeroen VAN KOOPEREN
Luchtverkeersleiding Nederland

Observers

Mr Emil KARLSSON
Staff Committee (Servants)

MANAGEMENT

Director General of EUROCONTROL

Eamonn BRENNAN

Director of MUAC

John SANTURBANO

MUAC Board

Niels LOKMAN
Chief Operating Officer

Aude BARBIER
Head of Human Resources

Martin SCHNEIDER
Head of Current Operations

Razvan MARGAUAN
Head of Technical Systems

Chris JEEVES
Head of Strategy and Performance Management

Chris STADLER
Head of ATM Strategy

Bart VANDERSMISSEN
Head of Change Management

Philippe DE COUNE
Head of Finance and Procurement

STATEMENT BY THE MCG CHAIR

After a turbulent 2020, 2021 continued to provide MUAC with some substantial challenges. The ongoing COVID-19 pandemic meant that the health and safety measures for staff were reinforced while preparations for the traffic recovery were put in place.

MUAC has always looked for the opportunities in a crisis and this year was no exception. Whether it was continuing ATCO training via a new remote platform or taking the chance to accelerate some airspace design projects (utilising the extra availability of the ATCO staff), the Centre has ensured that it is in a good place for the resurgence of traffic.

As a critical infrastructure, providing services to both civil and military customers, MUAC must both continue to operate during the crisis and provide the highest possible level of service throughout the recovery period and beyond. I am happy to report that the Centre achieved these goals and even went further by engaging with the airspace users, providing innovative tailored services to meet their needs.

As Chair of the MCG, the pandemic also affected our meetings with one meeting held via teleconference and one in a hybrid setting. Despite this, it was good to see the work of the Centre delivering good results and I was particularly gratified to see the Cooperation Agreement between EUROCONTROL, skeyes and the Belgian Ministry of Defence for a Shared ATM System being signed during my tenure.

You will read in this report about the performance of MUAC over the course of 2021. This performance would not have been possible without the dedication and effort of the employees of the Centre. MUAC strongly believes in its employees and their potential, and it has made substantial efforts to foster engagement and innovation at all levels of the organisation.

It is the spirit of the staff which drives the culture, and it is this culture which will be required as we emerge from the pandemic. Traffic recovery planning is done, ATCO competence is maintained and the Centre is ready and looking forward to supporting all of its stakeholders in 2022.

Koen MILIS
Chairman of the Maastricht Coordination Group during 2021

STATEMENT BY THE DIRECTOR OF MUAC
JOHN SANTURBANO

For MUAC, 2021 ended on a high note at our annual customer consultation where the participants (representatives from airlines, military partners and states) rated their appreciation for the MUAC services at 97.5% - a record over the many years that we have been running these meetings!

As Director, I reflect on the way that the staff of MUAC responded to the challenges posed by the COVID-19 pandemic. As an example, the immediate focus at the start of the pandemic was to ensure that our current ATCOs stayed current and that our training could continue. The solution was to convert our simulator environment to be able to work seamlessly in a remote configuration. The result is that our ATCOs kept their licences and skills up to date to now successfully cope with the traffic recovery. In the previous year it was all about coping and making things work. In 2021, it was about making the best from the situation – ensuring staff health and safety and then pushing on in the innovative spirit for which the Centre is renowned.

Looking back on 2021, the MUAC traffic followed the global trend with the positive signs of recovery being seen in the latter part of the year. MUAC is a civil-military, cross-border unit and so the work continues 24/7/365. Traffic was handled safely and efficiently, with next to no delay and the environmental performance was very strong with traffic following the shortest routes through the MUAC airspace.

Despite the challenges, MUAC continued to develop in 2021. Some of the key milestones were the launch of the world first live operational trial to prevent the formation of contrails (something that, as Champion Environment in FABEC, I am very enthusiastic about), the signing of the SAS3 Cooperation Agreement, two big airspace changes on the boundary with DFS Karlsruhe and the creation of a 'global top' layer in our Hannover Sector Group.

In 2021, the scrutiny from the four MUAC states on our budget continued. Clearly MUAC is not immune from the cost pressures being faced by the entire industry and we endeavoured to play our part, making savings across the board and so being able to return significant contributions to the states.

Finally, I would like to thank the staff of MUAC for their efforts in the course of 2021. It was a year of challenges and they rose to the task, exceeding expectations and delivering value for all our stakeholders. The traffic recovery plan is in place and I am convinced that MUAC is well placed for the coming years.

John Santurbano
Director, MUAC

PERFORMANCE THROUGH INNOVATION

2021 HIGHLIGHTS

JANUARY

- First worldwide live operational trial on contrail prevention launched

MARCH

- Airspace sectors optimised to fully benefit from free route airspace (MAASERATI)

APRIL

- Traffic recovery plan set up
- MUAC-EUROCONTROL Innovation Hub cooperation leads to AI algorithm to predict aircraft take-off times

AUGUST

- Data link moves forward: new ADS-C replaces FANS 1/A

SEPTEMBER

- SAS3 agreement signed: all civil and military air traffic controllers to use the same system to manage Belgian airspace

OCTOBER

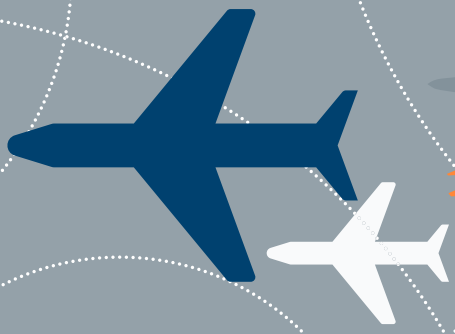
- First package of large-spectrum airspace optimisation implemented between MUAC, Karlsruhe and Langen

NOVEMBER

- 2021 customer initiative trial delivers results – September-November 2021
- Cooperation agreement with Slovenia Control to deploy ATM Data as a Service concept
- Hannover Global Top trial started, reconfiguring airspace sectors for more efficiency and flexibility
- 2030 concept of operations launched

DECEMBER

- Declaration of intent for greater cooperation signed between MUAC and DFS
- Practically zero delay in 2021



MANAGEMENT REPORT

KEY RESULTS VS 2020 ANNUAL PLAN TARGETS AT A GLANCE

KPA	Target Description	Target Value	Result
Safety	Zero Separation Infringements (with and without MUAC contribution)	0	10 –
	In any case, have no more than 3 Class A/B severity incidents with a MAASTRICHT UAC contribution	3	0 ✓
	Effectiveness of Safety Management	Level D: Safety risk management Level C: Safety assurance Safety policy and objectives Safety promotion	Achieved, ahead of 2024 deadline ✓
	Application of the Risk Assessment Tool (RAT) for ATM Ground severity for all reported SMI's and required ATM-SE	100%	100% ✓
	Application of automated safety data recording systems	CAMAR to be in place	CAMAR in place ✓
Environment	REDES Planned (Maximum route extension)	Max 7.40%	7.35% ✓
	REDES Actual (Maximum route extension)	Max 3.83%	4.26% ✓
	RESTR Planned (FRAM implementation indicator)	Max 1.65%	1.56% ✓
	RESTR Actual	Max 0.42%	0.62% ✓

KPA	Target Description	Target Value	Result
Customer Orientation	Biennial Stakeholder & Customer Orientation Review (SCOR) (30 key accounts)	Highly satisfied, min 90%	94% ✓
	Individual meetings with 30 key customers	15/30 bi-annually	To resume in 2022
Cost Effectiveness	MUAC Cost-base	194.0 M€	188.1 M€ ✓
	MUAC Budget – actual vs. planned	<=100%	95% ✓
	Financial cost per flight-hour	669€	603€ ✓
		670€	605€ ✓
Capacity	ATCO productivity in PRU ACE Benchmarking Report Clusters 1 and 2	>1.42 Flight-H per ATCO-H	1.52 ✓
	Average en-route ATFM delay per controlled flight (all delay causes) (MUAC)	0.96 minutes per flight	0.004 ✓
	Flight-hours / SOT (H)	> previous year	2.86 ✓
	Flight-hours	>= +16.7%	+142% ✓
	CRSTMP delay per CRSTMP delayed flights	<=15 minutes per flight	7.02 ✓
	Average en-route ATFM delay per controlled flight (CRSTMP delay causes) (MUAC)	0.15 minutes per flight	0.004 ✓

KEY RESULTS VS TARGETS AT A GLANCE

	Actual	Actual	Actual	Actual	Target	Actual
	2017	2018	2019	2020	2021	
Level of safety management effectiveness	✓	✓	✓	✓	✓	✓
Application of the severity classification based on the Risk Analysis Tool (RAT) methodology	✓	✓	✓	✓	✓	✓
Reporting Just Culture	On hold	On hold	In progress	In progress	In place	✓
Capacity *(average delay per flight in minutes)*	0.67 ✗	0.79 ✗	0.17 V ✓	0.01 ✓	0.15 ✓	0.004 ✓
Environment *(KEA)*	3.23% ✗	3.25% ✗	3.32% ✗	2.94% ✓	2.75% ✓	2.96% ✗
Cost-efficiency	Considered at national level (see previous table)					

TRAFFIC CHALLENGES

Traffic in 2021 was clearly affected by the COVID-19 pandemic, which had a serious impact on aviation and ATM globally. Throughout the year, the number of flights started low and began to increase during the summer months. Overall, in 2021, MUAC controlled 12% more flights than the year before, however it was still only 50% compared to 2019.

The Brussels sector group saw an increase of 14% compared to 2020, while DECO and Hannover grew by 4% and 13% respectively.

Similar to 2020, many of the problems commonly reported did not exist, and ATFM delays were close to non-existent, with the lowest number of minutes of delay in over 10 years.

In 2021, air traffic increased by 12% compared to 2020, reaching a total of 936,360 flights, however it remained at a 50% level compared with 2019.

The all-time traffic peak of flights handled in a single day was obviously not exceeded in 2021 and remains at 5,702 flights handled on 29 June 2018. In 2021, the average number of controlled flights in a day was 2,404.

The summer months (May-October) saw a 55% increase in traffic compared with 2020. During this period, MUAC controlled 2,848 flights each day on average.

Traffic planning based on STATFOR forecasts proved challenging with the start of the pandemic. Throughout the year, different traffic evolution scenarios were published, all coming with a high degree of uncertainty and a big variance across scenarios.

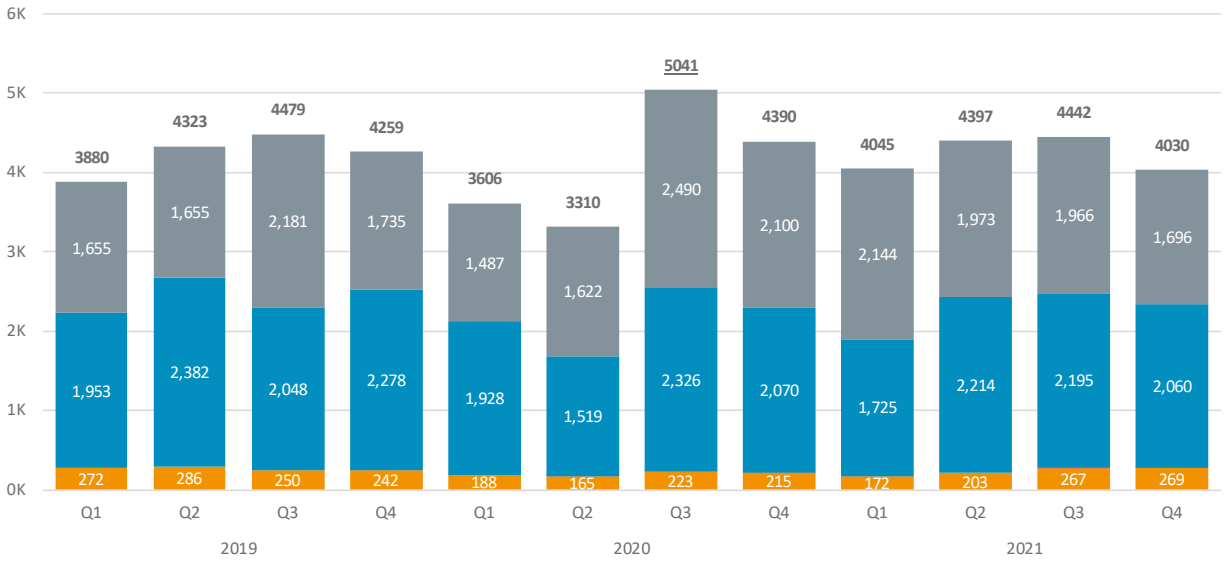
MUAC traffic (2020 vs 2021; %)	2020	2021	%
MUAC traffic - NM	832.888	936.360	12,4%
Traffic Brussels – MOST*	363.046	413.432	13,9%
Traffic DECO – MOST*	313.294	325.746	4,0%
Traffic Hannover – MOST*	344.055	387.104	12,5%

*MOST: Maastricht Operational Statistics Tool

IN 2021, AIR TRAFFIC DECREASED BY **12%** OVER 2020, REACHING A TOTAL OF **936,360** FLIGHTS.

Number of military flights (OAT and GAT) in the BR UIR, HAN UIR and AMS FIR above FL245

Military traffic and civil special operations filing OAT or GAT was hardly affected by the COVID pandemic. The total traffic numbers were similar to previous years. The flights controlled included inter alia: Airbus serial production flights, Air-to-Air refuelling operations, Supersonic flights and high altitude UAVs.



MIL TRAFFIC DISTRIBUTION BY MIL TYPE

Figure: Total numbers of special operations traffic in the MUAC AOR from 2019 to 2021 by quarter (including military traffic filing OAT and GAT). In grey the number of OAT/GAT flights handled by the Special Operations Sector group, in blue the number of military OAT/GAT flights handled by the Standard sectors, in orange the flights handled by both (i.e. handed over in MUAC airspace).

SAFETY

In line with Commission Implementing Regulation (EU) 2019/317 laying down a performance and charging scheme in the single European sky, two leading and lagging safety performance indicators are closely monitored at MUAC, namely:

- the effectiveness of the Safety Management System (SMS), and
- the rate of Separation Minima Infringements (SMIs) per number of controlled flight hours within that airspace.

Additional lagging indicators measured at MUAC are:

- the number of SMIs by severity, and
- the number of automated safety data recordings.

These lagging safety performance indicators provide data contributing to establish safety trends.

Over the course of 2021, MUAC's reporting culture continued to be positive, and overall safety performance was good, since we had zero risk-bearing incidents in the airspace.

During the reporting period, there was one severity 1 occurrence which affected the Real Time Tactical Server which caused a failure of the iFMP. Detailed information about the incident was published in a Technical Problem Report.

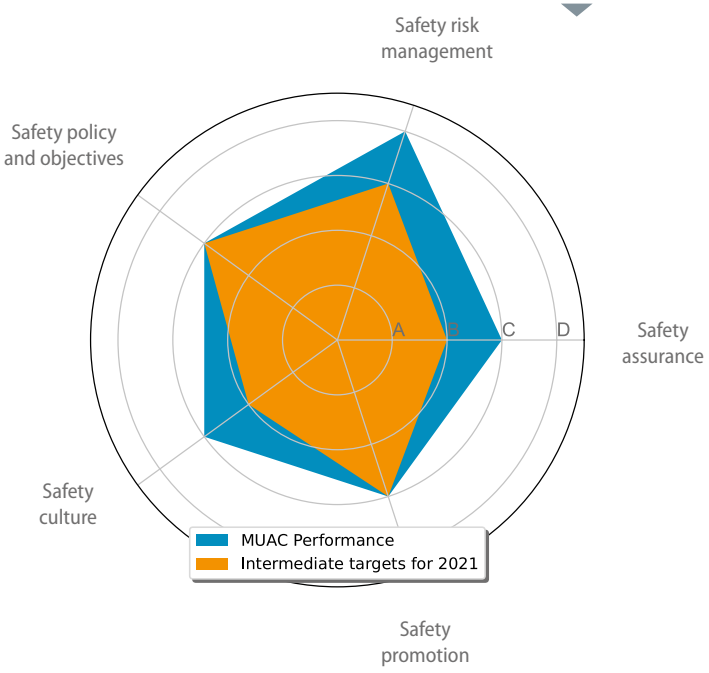
All the other lagging indicators remained within the defined threshold.

Leading safety performance indicators

Effectiveness of Safety Management

The FABEC intermediate targets for 2021 are described in Table 1. The scale goes from A (low effectiveness) to D (high effectiveness). As the figure illustrates, both the intermediate and the 2024 targets were achieved.

Figure 1 - Effectiveness of Safety Management Objectives in 2021.



Year	Safety assurance	Safety risk management	Safety policy and objectives	Safety culture	Safety promotion
2021	B	C	C	B	C
2022	B	C	C	C	C
2023	C	D	C	C	C
2024	C	D	C	C	C

FABEC intermediate targets for effectiveness of safety management objectives.

SAFETY

Lagging safety performance indicators

Separation Minima Infringements per controlled flight hours

The monitoring indicator defined in Commission Implementing Regulation (EU) 2019/317 is the "total number of separation minima infringements with any contribution from air traffic services with a safety impact divided by the total number of controlled flight hours within that airspace."

Table 2 emphasises the non-linear decrease in SMI occurrences compared with the previous year.

Separation Minima Infringements by severity

Whilst MUAC's goal is not to contribute to any accidents or separation infringements, MUAC has established a threshold of three separation minima infringements of severity A and B attributed to MUAC per year for which, when reached or surpassed, an additional analysis is performed to identify whether there are any underlying systemic problems.

In 2021, the lagging safety performance indicator for MUAC was below the threshold set, i.e. there were no severity A or severity B separation minima infringements for which MUAC was responsible. This is shown in Figure 3 together with the figures for previous years.

In addition to this lagging performance indicator on the severity A and B infringements, another internal performance indicator is the total number of severity C and severity E separation minima infringements with a MUAC contribution. The aim of these indicators is to provide an "early warning" that the KPI for severity A and B might be underrepresentative. It allows MUAC to get a more complete picture of the overall risks.

A ceiling of 10 severity C and 25 severity E separation minima infringements with a MUAC contribution was imposed for 2021, with the actual number of incidents amounting to one severity C and two severity E.

Table 2 - early overview of controlled flight hours and SMIs.

Year	SMI [-]	Controlled flight hours [h]	SMI per flight hour [-/thousand hours]
2014	31	587,348	5.3
2015	28	600,976	4.7
2016	34	625,908	5.4
2017	31	645,067	4.8
2018	30	667,869	4.5
2019	20	667,602	2.9
2020	5	289,992	1.7
2021	3	311,842	1.0

Automated safety data recordings

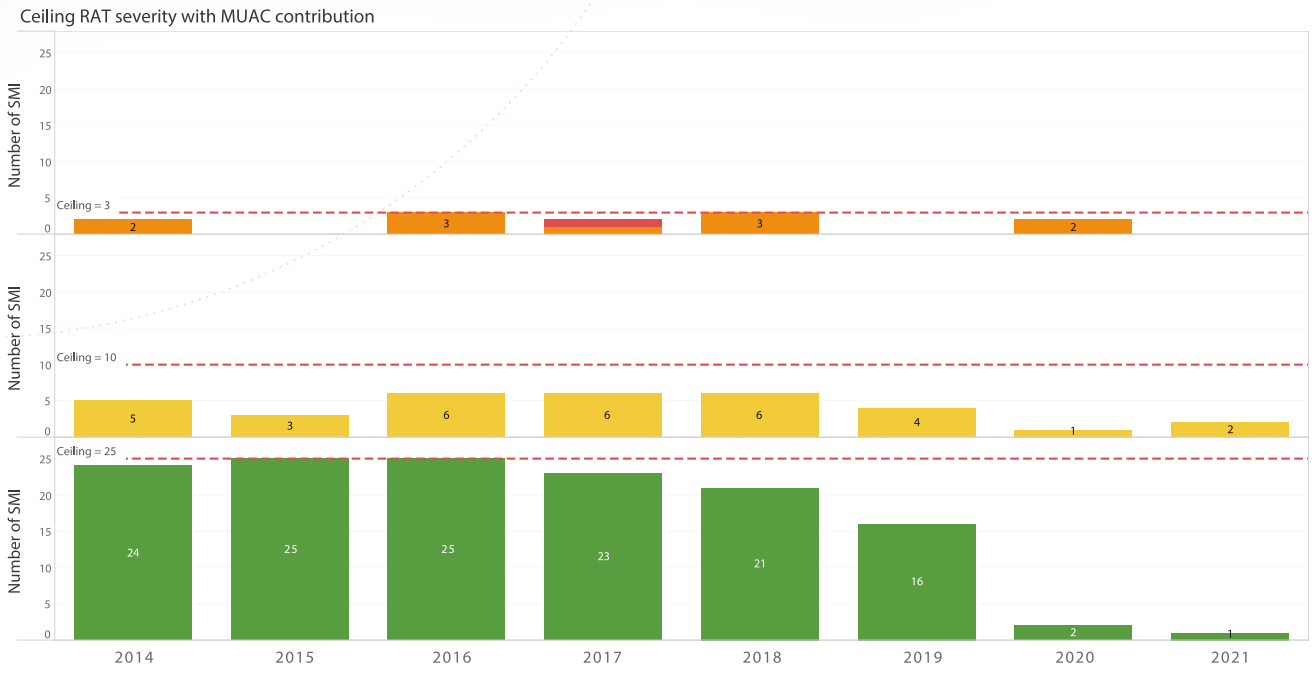
To allow the measuring of the level of reporting, MUAC uses the CAMAR (Conflict Alert Message Analysis and Reporting) tool, which utilises STCA events to record losses of separation. Through the analysis of CAMAR data, MUAC is able to independently verify the reporting culture at MUAC for separation minima infringements.

In 2020, all events detected in CAMAR were also reported manually for incident investigation. Three events reported manually did not trigger an automated recording because a different logic was applied to calculate the minimum distance.

Events 4.9NM or less and less than 800ft	
Events retained in CAMAR	Events manually reported
4	7

Overview of events reported automatically and manually.

Figure 2 – Overview of SMIs with a MUAC contribution by RAT severity with threshold.



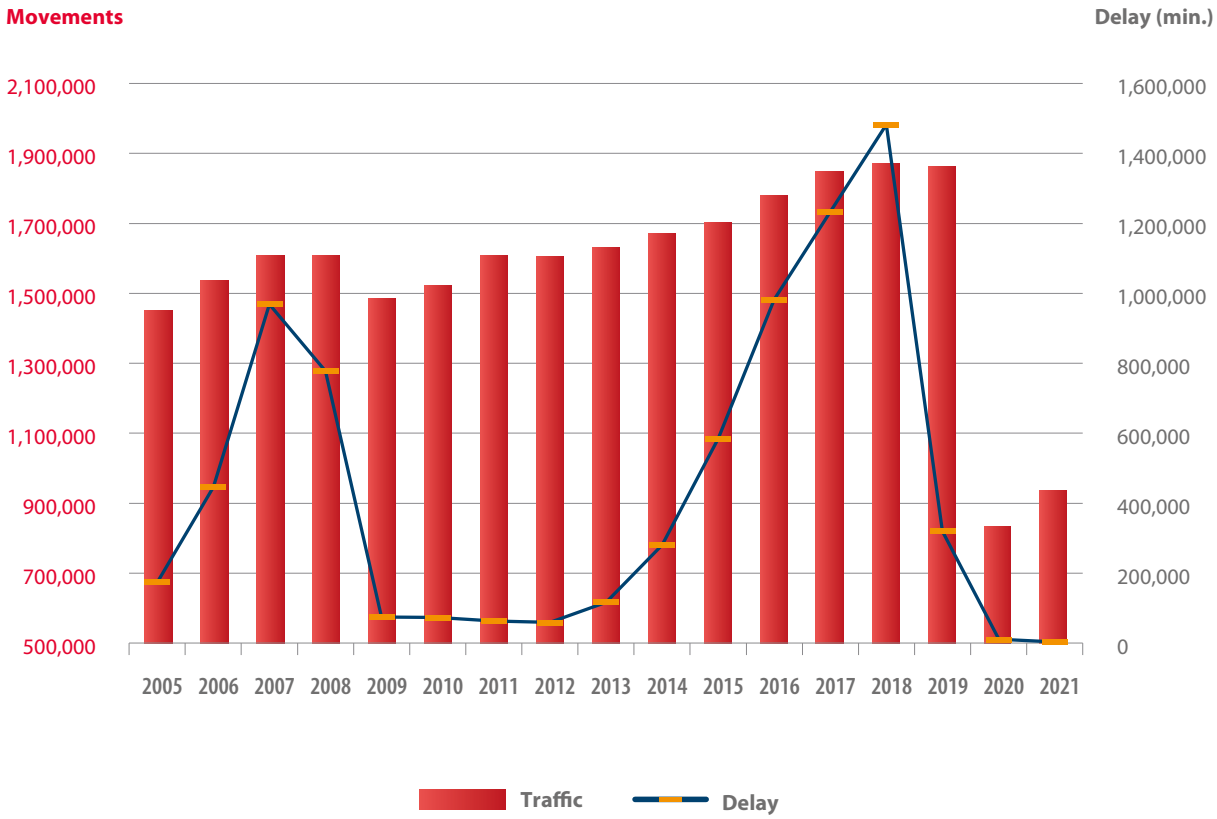
CAPACITY

Since 2020 ATFM delay has been almost non-existent, therefore this section of the report has been reduced significantly and contains only high-level statistics.

In 2021, MUAC generated 4,013 minutes of delay, a 63% decrease compared to the year before.

In terms of delay/flight, MUAC recorded 0.004 minutes of delay per flight and a 99.9% punctuality rate.

The positive performance on delay/flight in 2021 is obviously due to the low volume of traffic caused by the effects of the global pandemic on aviation in general.



TRAFFIC AND ATFM DELAY TRENDS 2005-2021

2021 remained close to 2020 traffic levels, whilst ATFM delays dropped further by 63%%.

The volume of delays reported for the years 2005-2009 in the ATM Cost-Effectiveness (ACE) Benchmarking Report differs from the figures reported in the chart above owing to the exclusion of tactical delays on the ground (engine off) of less than 15 minutes.

ATCO productivity

With 1.52 IFR flight-hours per air traffic controller-hour, MUAC's air traffic controller productivity continued to be affected by the pandemic throughout the 2021 business cycle. IFR flight-hours increased by 7.5%, whilst the number of ATCO hours on duty were reduced by 8.4%.

MUAC	2020	2021	% variation
IFR flight-hours controlled	289,985	311,836	+7.5%
ATCOs/OPS hours on duty	224,104	205.295	-8.4%
ATCO productivity	1.29	1.52	+17.4%

AIR TRAFFIC CONTROLLER (ATCO) PRODUCTIVITY 2020-2021

ATCO productivity increased from 1.29 in 2020 to 1.48 in 2021. This indicator is the ratio between IFR flight-hours controlled and ATCO-hours on duty.

ENVIRONMENT

Reducing CO2 emissions

Year after year, MUAC strives to increase flight efficiency by offering shorter routes and fuel-optimal vertical flight profiles in order to achieve the ambitious European aviation target of reaching net zero emissions by 2050.

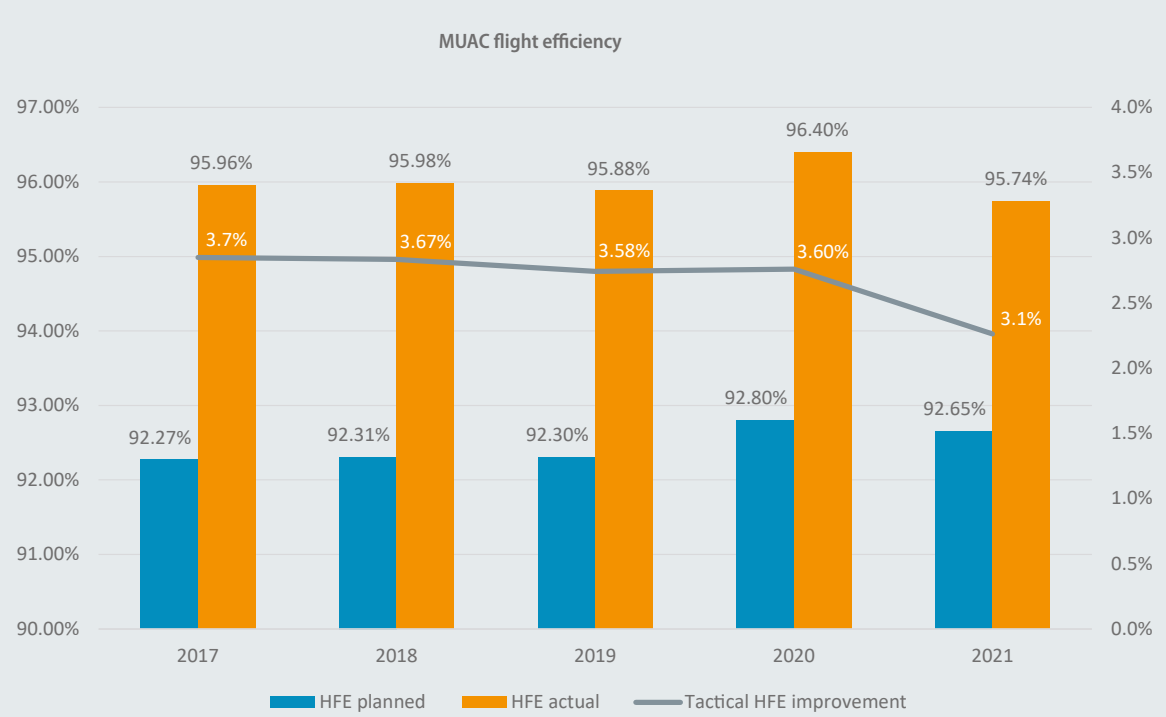
Since 2009, MUAC has been monitoring horizontal flight efficiency (HFE) (calculated as the ratio of route extension relative to the approach of the flight to its destination as performed in MUAC airspace) both for the actual trajectories and for the last filed flight plans.

With a post-pandemic increase of number of flights in 2021, the horizontal flight efficiency based on actual trajectories has deteriorated compared with the year before, from 96.43% in 2020 to 96,35% in 2021, however, the last value is better than the values in the years before 2020. The horizontal flight efficiency based on the last filed flight plan and shows a significant increase from 92.62% in 2020 to 92.82% in 2021, which reflects MUAC efforts to implement airspace projects such as the H24 FRA, MAASERATI and the close civil-military cooperation.

The difference between the actual and planned flight extension, the tactical HFE improvement, was 3.53% in 2021. Although it would be beneficial (for predictability purposes at least) to reduce the difference between the planned and actual figures, the graph shows a constant gap between the two values and it is unlikely that this difference will disappear in the foreseeable future.

In the meantime, we can state that the improvement contributed to the flight efficiency by MUAC controllers during the tactical phase (among others by giving directs to airliners and using available military areas) resulted in a total reduction in the flown distance of more than 3,990,000 NM (approximately 4.3 NM per flight), saving more than 23,000 tons of fuel and reducing CO2 emissions by more than 73,000 tons in 2021.

Looking in more detail into flight efficiency, we can see that the internal component of route extension



based on the actual trajectory has remained relatively constant. The very low value (0.45%) indicates that almost all flights in the MUAC area are flying directly. The remaining 3.2% of route extensions show the interface component, or the network contribution to flight inefficiency, which for the most part does not depend on MUAC operations.

The internal component of flight extension implied by the planned trajectories, has improved in the past two years, because of substantial improvement of the internal MUAC route network. The remaining 5.54% of the flight extension, the network component, should be attributed to the existing route structure, airspace design, allocation of military areas, but also to drawbacks in the flight planning process, leaving some room for improvement.

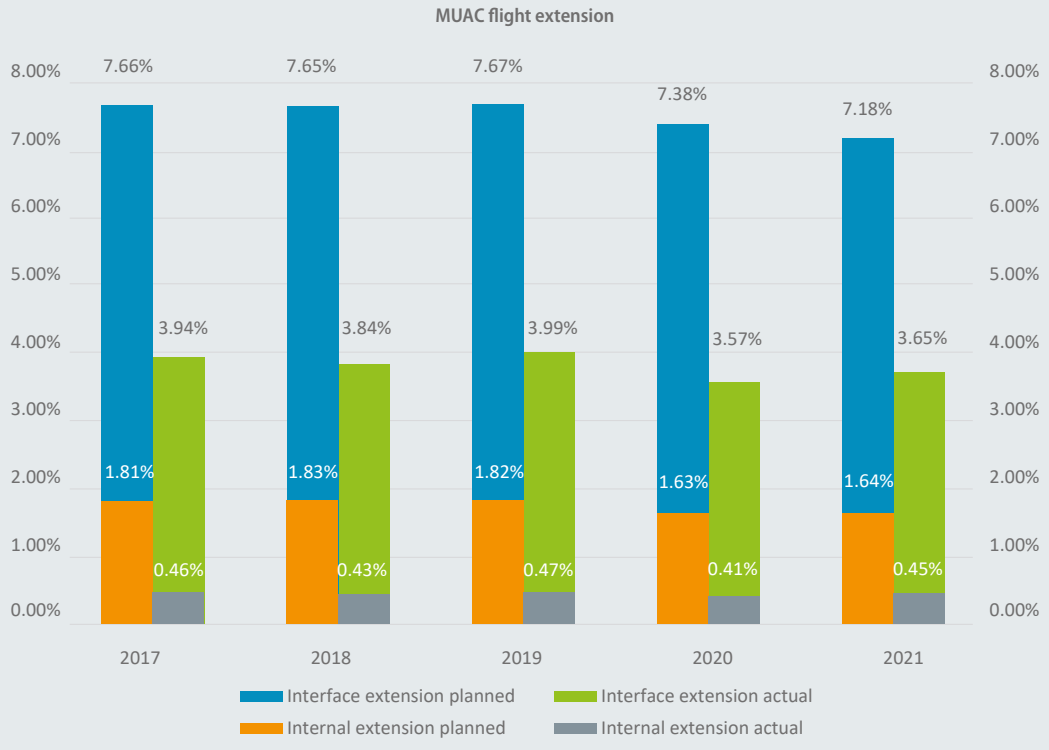
Non-CO2 emission

The first-ever operational real world contrail prevention trial took place in the airspace of EUROCONTROL Maastricht Upper Area Control during 2021, in partnership with the Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR).
From January until October 2021 the first trial of preventing contrails was performed on real flights controlled by MUAC. The trial aimed to assess how warming persistent contrails can be avoided with eco-efficient flight trajectories in live operations. The operational process consisted of the vertical deviation of flights away from ice super-saturated layers in the atmosphere by plus or minus 2000 feet. Tactical decision making was based on numerical weather prediction for relative-humidity and temperature, enriched with algorithms about the formation of persistent contrails.

Using satellite images of high clouds and by the application of a contrail detection algorithm the DLR proved that deviations were successful, i.e. persistent contrails can be avoided for regular flights in the real world. For the first time in the world we have been able to demonstrate that avoiding persistent contrails is possible. This is a necessary step towards eventually reducing the climate impact of aviation by means of air traffic control (eco-efficient trajectories).

Footprint reduction initiatives

The Maastricht Environment Group (MEG) (established in 2020) assesses the environmental impact of our site (the MUAC building and its surroundings), information technology (computers, office equipment, etc.), staff activities (e.g. resource saving habits, emission/pollution reduction, commuting, recycling, etc.). Ideas and proposals from staff are collected and analysed (more than 30 ideas received) and alternatives for reduction of our footprint are considered and responsible solutions have been proposed.



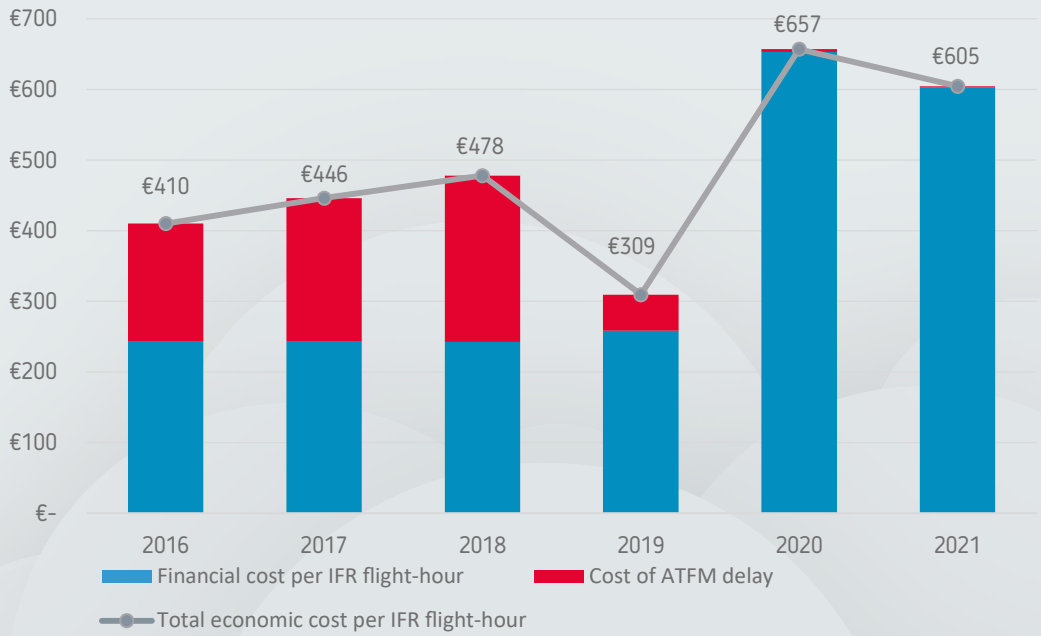
COST-EFFICIENCY

Positive financial results and a substantial improvement in total economic cost

In 2021, the cost-base amounted to M€188.1. In nominal terms, costs were down by -0.7% compared with 2020, mainly driven by lower depreciation costs. In addition, MUAC managed to stay well within its agreed 2021 cost-base of M€193.9, thereby saving M€5.9, mostly in operating costs.

MUAC recorded a total financial cost per IFR flight-hour of €603, a value which is lower than in 2020 (€653 in 2020 euro values).

The key performance indicator for cost-effectiveness, defined in the SES II Performance Regulation, is the determined unit cost. Since this is calculated on the basis of consolidated costs at national level, the concept of an MUAC equivalent unit cost was introduced as a performance indicator, taking into account the specific MUAC service provision costs. "Equivalent" indicates that the calculation does not take the full cost of MUAC service provision into account. For example, the cost of using national CNS infrastructure (which is made available free of charge by the Four States) is not included.



TOTAL ECONOMIC COST PER IFR FLIGHT-HOUR (2020 euro values) – TREND 2016-2021

The total economic cost per IFR flight-hour controlled (or unit economic cost) is a standard key performance indicator used in the ATM Cost-Effectiveness (ACE) benchmarking reports, which are produced by the Performance Review Commission (PRC). It is the sum of ATM/CNS costs (or financial cost) and ATFM delay costs per IFR flight-hour. The MUAC unit financial costs increased to €603, owing to the low number of IFR flight-hours.

ACE report highlights MUAC's strengths and challenges

In May 2022, the ATM Cost-Effectiveness (ACE) 2020 Benchmarking Report was released.

The productivity and financial cost-effectiveness indicator confirmed MUAC's ranking among the top-performing ANSPs in Europe in 2020.

The economic gate-to-gate cost-effectiveness indicator per IFR flight-hour deteriorated significantly, increasing from €309 in 2019 to €657 in 2020. This was the result of the COVID crisis and the low number of IFR flight-hours.

MUAC	
Financial cost-effectiveness	**ATCO-hour productivity**
 **653** *+152.7%*	 **1.29** *-42.3%*
Employment costs per ATCO-hour (€2020)	**Support costs per unit of output (€2020)**
 **345** *+35.2%*	 **385** *+167.5%*

CHANGES IN THE FINANCIAL COST-EFFECTIVENESS INDICATOR (2020 euro values) 2019-2020

The little bar chart icons presented on the left-hand side of the mail KPI's indicate in which quartile the ANSP is positioned (one bar meaning the ANSPs performance is below the first quartile, two bars between the first quartile and the median, three bars between the median and the third quartile, and four bar above the third quartile.

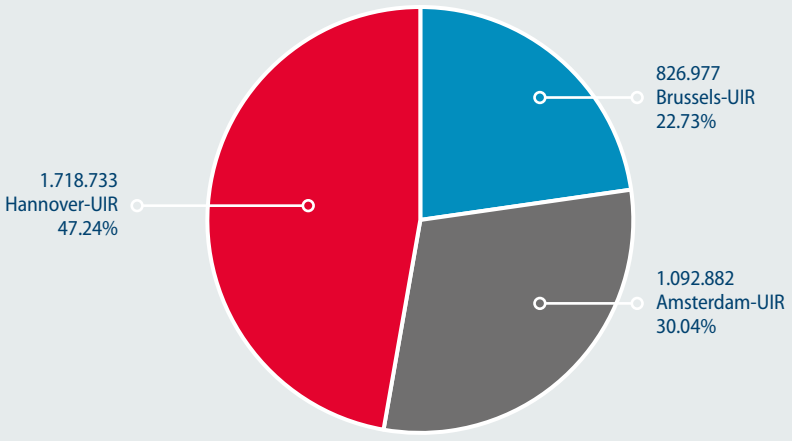
Service units and revenue distribution to States

The number of service units produced within MUAC airspace slightly increased by 7.4% in 2021, while overall revenues increased by M€31.3. The national unit rates in all countries increased in 2021.

	SUs and revenue distribution – 2020/2021 (2020 euro values)							
	2020			2021			SUs 2021/ 2020 (%)	Revenues 2021/2020 (M)
State	SUs	Route charges	Revenues (M)	SUs	Route charges	Revenues (M)		
Belgium/Luxembourg	779,306	€ 91	€ 70.9	826.977	€ 99.3	€ 82.1	+6.1%	+€11.2
Netherlands	1,049,566	€ 67.3	€ 70.6	1,092,882	€ 68.7	€ 75.1	+4.1%	+€4.5
Germany	1,559,063	€ 63.6	€ 99.2	1,718,733	€ 66.8	€ 114.8	+10.2%	+€15.6
MUAC	**3,387,935**		**€240.7**	**3,638,592**		**€272.0**	**+7.4%**	**+€31.3**

SERVICE UNITS, NATIONAL UNIT RATES AND REVENUES PER SECTOR GROUP (€M – 2021 euro values) – TREND 2020-2021

Revenues distributed to States increased by M€31.3 (in real terms) in 2021.



SERVICE UNITS IN 2021

Breakdown of service units in the Amsterdam FIR, the Brussels UIR and the Hannover UIR, respectively.

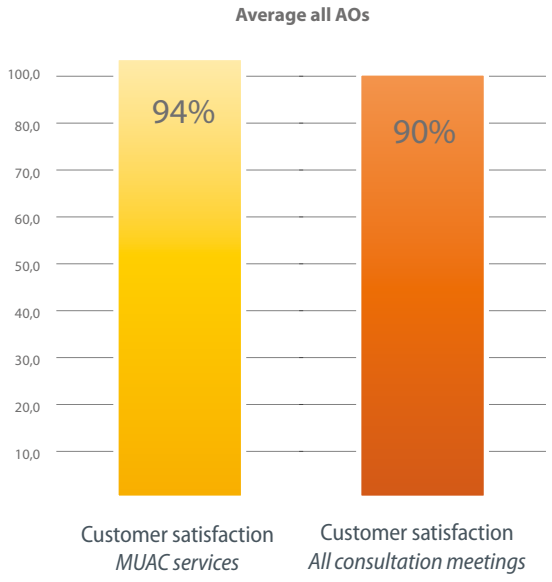
CUSTOMER ORIENTATION

Reduced traffic levels due to the pandemic and the need for aircraft operators to focus on the recovery continued to affect the traditional programme of civil and military customer consultation activities. Nonetheless, important projects continued to be discussed at bilateral level in order to boost collaborative initiatives.

Customer relationship management

Customer satisfaction

Over the reporting period, overall customer satisfaction for MUAC services in general reached a record 94%; satisfaction about the effectiveness of all MUAC consultation activities scored 90%. Aircraft operators regularly commented that meeting on-line was not the preferred option.



Civil customer consultation and involvement

In 2021, like the previous year, the number of individual customer consultations meetings was drastically reduced to enable aircraft operators to fully concentrate on the recovery. Throughout the reporting period, both civil and military customers were regularly informed about the way MUAC managed the pandemic, both from the operational and the staff health and safety points of view, and what was planned to support the recovery. Several bilateral meetings were held on-line, the annual customer consultation meeting was also held on-line, with 20 delegates representing airlines, freight operators, Computerised Flight Plan Service Providers, airline associations and the US Air Force. The meeting was rated successful by the participants, with a score of 89 % satisfaction.

2021 saw major advances in cooperative and support activities involving the aircraft operators' community.

Regular aircraft operator AIRAC briefs were published informing airlines and CFSPs about significant changes in routeings, free route airspace points and RADs in the MUAC airspace. The brief aims to support the monthly update of route databases and a smooth transition to a new AIRAC (aeronautical information regulation and control).

In 2021, Eighty-seven aircraft operators, London Heathrow Airport, seven air navigation service providers (ANSPs) and the EUROCONTROL Network Manager teamed up to trial a unique customer service, the so-called Customer Initiative.

The Customer Initiative addresses flight trajectory inefficiency, offers coordinated tactical directs or higher cruising levels, or arranges exceptional non-standard routings and profiles for priority and critical flights in support of aircraft operators' operations and fleet management. Priority and critical flights are related to EU 261 incidences, airport curfews, crew hour limitations, rotation problems, delays with a high financial impact, passenger and freight connections, or schedule disruptions and the associated network shock wave. The focus is on achieving high-value results, in particular by proposing the best possible flight planning options, which might not be detected by flight planning software, and by guaranteeing on-time arrival.

The 2021 Customer Initiative trial, which took place from 15 September to 15 November 2021 in the airspace of Belgium, Germany, Luxembourg, the Netherlands, France, Switzerland and the UK, revealed encouraging results and the feasibility of offering enhanced customer services on a permanent basis in the MUAC airspace and in the airspace of the participating FABEC and UK/Ireland control centres.

The measurable results revealed that for a total of 1,686 flights which benefited from the service, the savings achieved amounted to 177,000 kg of fuel; 556,000 kg of CO2; 6,842 nautical miles; 9,778 minutes (equating to €977,000 saved on the basis of the economic value of 100€/minute); and €3,923 in route charges.

In addition to the measureable benefits, other non-quantitative improvements were identified. For example, the trial demonstrated that the processes and the tools used worked smoothly and effectively for the partners. Thanks to the supporting technical solutions (the ATM portal and pre-flight check human-machine interface), the participating operational units were in a position to easily identify and propose flight improvements to the aircraft operators. The operational units involved in the pre-flight check process were in a position to unlock the full benefits of improved flight profiles, RAD (profile restriction) override, deviations from letters of agreement, air traffic flow management (ATFM) regulation delay handing, priority flight handing and critical flight care.

Of particular interest to the aviation sustainability challenge, so-called "trade-off" cases were facilitated for the first time. Through collaborative decision-making (CDM), alternative routings with "non-obvious" solutions were offered to and taken up by the aircraft operators, for example routes with a higher cost but fewer emissions.

The trial also revealed that in a dynamic and innovative environment, it will be possible in the future to better support aircraft operators in their flight planning process following any airspace design change implementation.

Finally, the 2021 Customer Initiative trial proved that it is possible to complement the network view with local knowledge and to create synergies between local, regional and network services to replace the current verbal communication.

Military Customer Consultation

Like the whole aviation industry, the Military were impacted by the pandemic. While Military flight operations returned to normal numbers, on-site meetings were limited or cancelled altogether. However, over the reporting period, MUAC managed to improve and strengthen its relationship with its military and special operations partners by means of bespoke online bilateral meetings. The annual military customer consultation - OAT@MUAC had to be postponed again. MUAC's next Military Customer Consultation Meeting OAT@MUAC is now scheduled for November 09-10 2022 at Genk (BE).

MUAC'S CONTRIBUTION TO FABEC PERFORMANCE

The FABEC performance plan was drawn up to cover SES Performance Plan Reference Period 3 (RP3 – 2020 to 2024). It incorporates the key performance areas of safety, the environment and capacity for the whole region, while military mission effectiveness and cost-efficiency targets are addressed at national level. MUAC cost-efficiency targets are agreed by the Four States. Air traffic volumes in FABEC airspace increased from 2,696,221 flights in 2020 to 3,245,402 flights in 2021, however still well below the 2019 values of 6,240,724 flights.

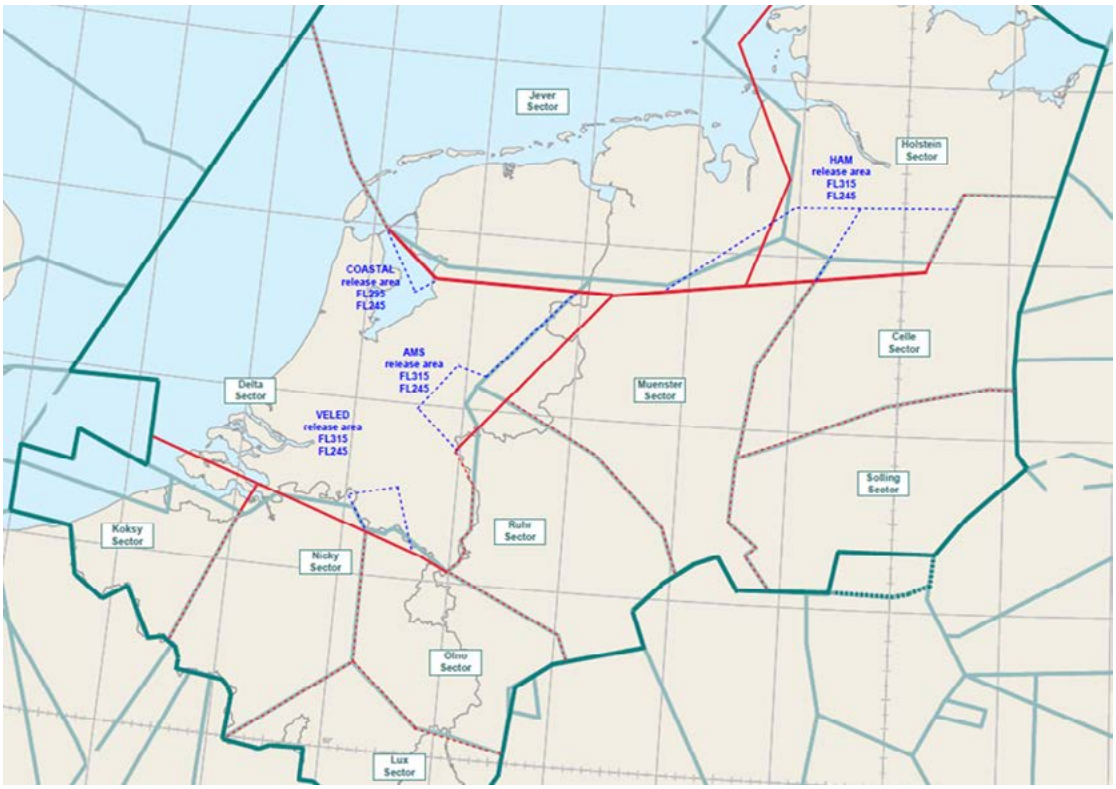
Optimising airspace design and use for sustained performance

OPTIMISING AIRSPACE DESIGN

MAASERATI deployment 1

After the introduction of the H24 Free Route Airspace within the MUAC area of responsibility, MUAC gained enough data and experience to adapt the sector boundaries in order to accommodate the most efficient traffic flow. The project started in 2020 and was finalised and implemented in March 2021. The major benefit of this change was the reduction in sector clipping and internal coordination. The airspace was optimised to allow for efficient FRA operations and a reduced workload.

Deployment 2, envisaged to be implemented in 2022, will further optimise the traffic flows and internal working procedures.



Cooperative Optimisation of Boundaries, Routes and Airspace (COBRA West)

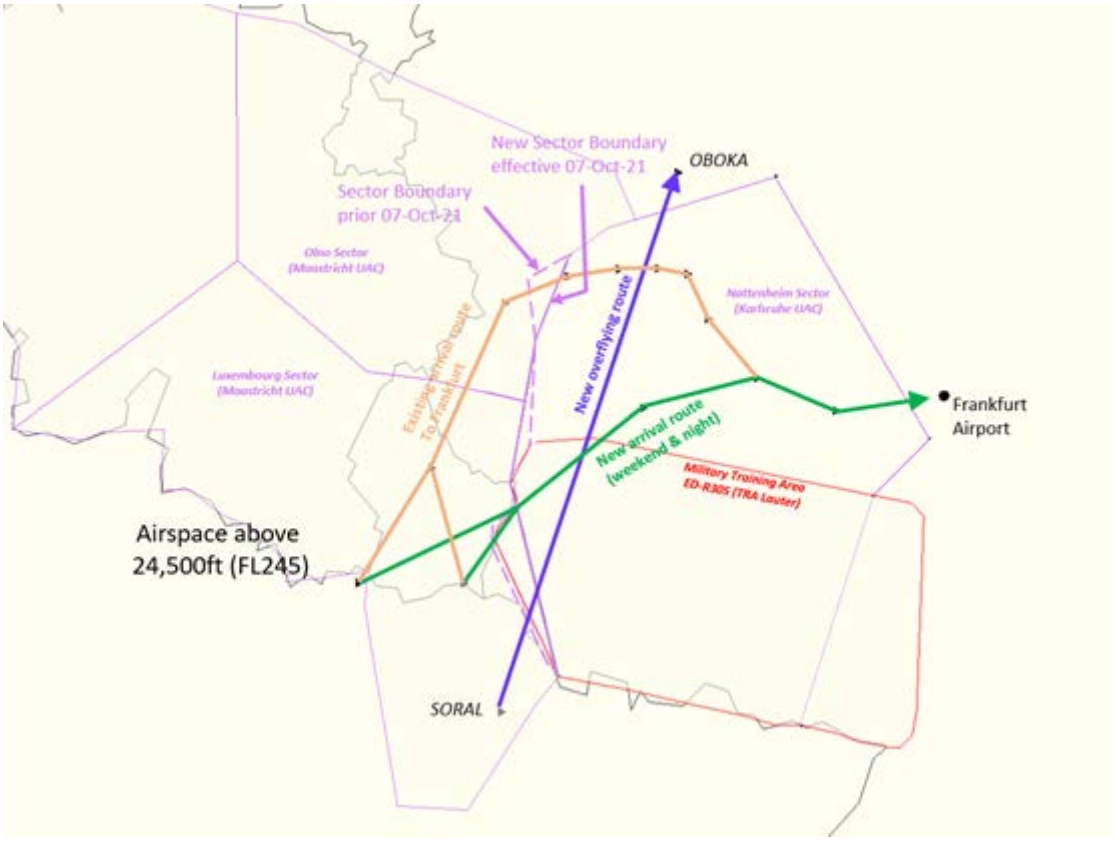
At the end of 2020, the 'Deutsche Flugsicherung' (DFS) and EUROCONTROL Maastricht Upper Area Control Centre (MUAC) signed a collaboration agreement, which encompasses a range of bilateral initiatives in the area of airspace optimisation, technical cooperation and harmonisation of procedures.
One of the elements of this collaboration is focussing on an improved interface between the 'Nattenheim'-sector in Karlsruhe UAC and the East sectors ('Olno' and 'Luxembourg'-sectors) in MUAC. This activity is referred to as the COBRA. This COBRA project was split into a 'Central' and a 'West' package, to distinguish the interface between Karlsruhe and the Hannover Sector Group on one hand, and Karlsruhe and the Brussels Sector Group on the other hand. The COBRA West airspace changes came into effect on the 7th of October 2021 (COBRA Central modifications are planned for March 2022). The objective of both changes is to reduce complexity and ATCO workload.

Cross-border Arrival Management - XMAN

The goal of XMAN is to reduce aircraft holding times at congested airports by reducing their cruising speeds during the final en-route phase of flight. In this way, flight efficiency is increased, as fuel burn levels and CO2 emissions fall. Moreover, less airborne congestion in terminal areas will also contribute to improved operational safety by reducing pilot/ATC workload.

Following the successful implementation of the XMAN London Heathrow concept in November 2015, MUAC is continuing to support further trials and implementations of XMAN at other airports. 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.

In 2019, MUAC took part in the successful operational trials for London-Gatwick and Paris Charles de Gaulle



airports, both as part of FABEC projects and the SESAR Demonstration "xStream", which won the ATM Awards 2019 in the "Environment" category and the "Overall Excellence in ATM Award".

The operational trial for London-Gatwick was followed by the implementation of the procedure on a permanent basis in October 2019. For Paris Charles de Gaulle, the procedure became permanent in December 2020, but with COVID it was put on hold until recently when the procedure was activated again.

In line with the requirements set out in the European Pilot Common Project (PCP) Implementing Rule, the XMAN procedure will be extended to a total of 25 European airports by January 2024. To secure MUAC performance, we actively support the Multi-AMAN Integration Work Package.

Following the completion of these activities under SESAR 2020 Wave 1 by the end of 2019, they will be further coordinated only through the FABEC XMAN Programme.

Cross border civil/military operations and Flexible Use of Airspace

The Netherlands
The FUA Cell MUAC (FC-M) is part of the Netherlands AMC. The FC-M is staffed by Flow Management Personnel and is responsible for publishing the daily Air Space Use Plans for the Amsterdam FIR and any updates of the AUP – called UUPs.

MUAC also supported all major military exercises in its Area of Responsibility during the actual operations but also in the planning phase, for example: the international Dutch and German military exercises Frisian Flag and MAGDAYs respectively.

Belgium
MUAC has always been actively involved in the enhancement of the Flexible Use of Airspace (FUA) in the Brussels FIR/UIR. This has resulted in a trial of the so-called 'Rolling UUP' (R-UUP), starting in April 2021. By using the R-UUP, the Belgian Temporary Reserved Areas (TRA) that are not booked for military exercises within the next 3 hours are made available for the planning of GAT (General Air Traffic). This results in shorter route opportunities for civilian operators and in a more reliable and accurate capacity planning for Maastricht UAC. The trial will end on the 21st of January 2022, when the use of the R-UUP was officially accepted and published in the Belgian Airspace Management Manual.
In accordance with the 'Belgian Airspace Vision 2030', the next stage in the enhancement of FUA consists in the development and testing of a more accurate daily Airspace Use Plan (AUP). Instead of booking the entire Military Flying Window, the new AUP will only contain time slots for which concrete military exercises are planned. Any additional military airspace requirements that would appear on the day itself will be published per UUP or will be subject to Collaborative Decision Making (CDM) between the tactical partners. During 2021 MUAC has contributed to the preparation of a trial to test these new FUA methods in Belgian Airspace. This 'Booking Based AUP'-trial (BB-AUP) will start in March 2022 and will last for at least 6 months.

The continuous cross-training programme (from civil to military and vice versa) required a large effort of operational staff and the training organisation. As part of this effort, in total eight supervisors and seven ATCOs successfully completed training to support military and/or Airbus operations.

ATC2ATM

In 2021 this operationally focused programme has been extended in scope and re-branded into CONOPS 2030, to cover the evolution of MUAC operations up to 2030, and beyond. The intention is to provide the required capacity to meet the SES performance targets within budgetary and staffing constraints.

The CONOPS 2030 has a built-in flexibility to efficiently plan staff and the airspace while optimising performance. With performance, traditionally expressed by cost, capacity, productivity and delays, we additionally consider customer preferences and the elaborated view on the environmental footprint. The CONOPS 2030 is based on a high degree of automated support systems assisting users in the data-driven decision-making. The systems utilise predictive and machine-learned models to provide solution advisories, based on historical data augmented by real-time events. All relevant data from various MUAC systems as well as external sources (i.e. ANSPs, airports, NM, military units and airframes) will be integrated to improve the users' experience and their situational awareness. We assume CPDLC being the norm for communication with the aircraft. Using ADS-C data will close the loop, ensuring air-ground consistency.

The main deliverables for 2021 were the following.

Optimised Sector Manning

The project is developing a new concept of operations and required systems support to improve offload sector management. The new concept envisaged for tactical use in offload scenarios would allow for a more efficient transition in opening and closing sectors.

In 2021, two concepts (Assistant Controller and Offload Controller respectively), both aimed at increased tactical flexibility, were further simulated with improved system support features. The OC (Offload Controller) concept proved previously well suited for offload situations in nominal traffic conditions, has been simulated in special occurrences situations, supported by a systems feature allowing the Coordinator Controller of a lower sector to quickly assist as required. Next steps to be considered are operational trials in top layer sectors.

The AC concept development focused entirely on the ATCO team workload distribution, simulating sharing between Executive (EC) and Coordinator (CC) controllers. Non-complex CPDLC connected traffic was being assigned to CC, while complex, radio transmission based traffic was assigned to EC. They were supported by advanced HMI features allowing the delegation of traffic manually among each other, to see CPDLC clearances and its history, and by improved conflict detection. The next feature to be considered is automatic allocation of traffic to the appropriate controller.

Post-OPS Analysis & Business Intelligence (PABI)

In 2021 the operational data analytics abilities of MUAC were strengthened further with the ingestion of core ATC and ACM data sets, providing rich details about among others flight handling and sector manning, into the on-premise data warehouse, benefiting MUAC technical, operational and performance management units. Adding to these capabilities, the DSAL study continues to design and integrate MS Azure low-latency cloud data crunching services and is busy streamlining the respective Agency governance processes accordingly.

Customer service

Traffic Prediction Improvements (TPIs)

Following successful implementation of a machine-learning algorithm to predict horizontal flight routes, MUAC has continued to investigate how artificial intelligence (AI) can bring tangible benefits to sector workload prediction and the optimisation of traffic regulations, problems which are difficult to solve with traditional software logic.

The AI algorithm in the integrated Flow Management Position (iFMP) is able to predict the full 4D trajectory profile, including speed, rate of climb/descent and top of descent. Although less relevant for sector workload predictions in the iFMP look-ahead horizon, the extended AI capabilities are reusable by future conflict detection functionality.

An AI algorithm developed jointly with the EUROCONTROL Experimental Centre that predicts aircraft take-off times was implemented beginning of 2021. The AI algorithm is able to detect patterns in aircraft turn-around times at airports, congestion, and the impact of a delay assigned to a flight.

A third algorithm models how air traffic controllers skip or delegate sectors in the sequence of the flight path. It allows for considerable improvements to sector workload forecasts. Activation of the algorithm has been shifted from 2021 to 2022 because post-COVID traffic growth and the impact of recent airspace changes on controller working habits necessitate careful validation.

ATM-P

The ATM Portal project delivered an airline operator portal in 2018. Since then, it has been used at the MUAC Flow Management Position as an added-value tool and has been a key tool in the success of the Customer Initiative 2018-2021 trials.

Collaboration partners now include other ANSPs, namely Skyguide, the DSNA and the DFS and expansion to over 30 airline OCCs, with outreach to over 60 AOCs.

Airlines were invited to use the ATM-P to report on their flights with the highest business value, such as those flights with critical problems during daily operations, which facilitated better support to the most business-critical flights.

SESAR2020 validations & demonstrations

ADS-C

As part of the SESAR 2020 projects linked to the new ADS-C (i.e. Project 18 for validations of an enhanced trajectory predictor and Project 31 for live demonstrations), MUAC provided the downlinked Extended Projected Profile (EPP) and discrepancy indication (when not equal to the FDPS flight plan) to a sub-set of controllers in a pre-operational mode. MUAC's pre-operational demonstrations started in July 2019, finished under PJ31 in December 2020 and continue until end 2022 under SESAR 2020 Wave 3 PJ38 (ADSCENSIO). The operational deployment will be prepared in parallel with the SESAR activities and is planned for Q2 2022.

Interoperability via Flight Object

IOP/FO has been removed from the CP1 mandate, as a due date of 2027 is no longer feasible. The focus of MUAC and the IOP partners is now through EUROCAE WG59 with an updated version of IOP standard ED133-revA addressing the issues raised at the end of SESAR Exe#2 and also a simplification of the IOP protocol with the integration of eIOP solution (Essential IOP). The new ED133-revA is planned for September 2022.

Data services

SAS3

The Shared ATC System 3 (SAS3) study was concluded with the signature of the MUAC-skeyes-BEL DEF Cooperation Agreement (CA) in September 2021. The first activity of the project is the Definition Phase, to further refine and detail the operational and technical requirements and design of SAS3 and its architecture. The Definition Phase is planned to last till Q4 2022 after which the Development Phase of four years is planned to start.

MAKAN Cooperation – iFMP for Karlsruhe UAC

One of the MUAC flagship programmes is aimed at achieving the MUAC mission to become an ATM data service provider (ADSP). As part of this ambition, in 2021, MUAC conducted a large-scale study called MAKAN (MAastricht KArlsruhe Networks) with the DFS to investigate areas of possible cooperation. With regard to harmonisation, the study looked at whether the operating concepts could be adjusted and existing ATM system components could be used jointly.
The study was successfully completed late 2021 and MUAC signed a letter of intent for a comprehensive collaboration agreement setting out the scope, commitments and responsibilities for the collaboration.

One of the first common projects of MAKAN cooperation is the development and deployment of the iFMP tool for Karlsruhe UAC, planned in 2023. The tool will be an almost exact copy of the iFMP tool used in operations in MUAC since 2015, and continuously improved using all technologies available on the market (NM B2B data, artificial intelligence, ADS-B). This project will enable performance gains at Karlsruhe UAC, and develop further ATFCM collaborative decision making processes at the core area of Europe.

Staff

Proactive manpower planning

The manpower requirement is continuously monitored with regard to both controller and support functions.

Ab-initio recruitment is reviewed on a quarterly basis with the aim of balancing forecast traffic demand, ATCO outflow, and capacity gains from system and procedure developments.

For the support functions, the objective is to contain, or where possible reduce, staff numbers by assessing the business need for every support function prior to filling it.

Ab initio training at ENAC

In 2021, 19 ab-initio students obtained ATCO licences at MUAC.

AI75 started with 14 students in April 2021, and AI76 began with 12 students in November.

A number of around 60 students are at various stages of their training both at ENAC and at MUAC. After three courses that arrived from ENAC in the meantime, we are on the right track. The success-rate increased by 20% since 2015 and we can now take steps to improve and optimise it further.

Unit training at MUAC

MUAC was able to continue training as far as possible in the second year of the pandemic, with the help of the remote simulator.

Due to the situation, additional operational resources were available, which enabled us to overcome the identified challenges and revise the entire training system. The clear definition of the learning curve, as well as the development of improved simulation tools, contributed significantly to this.

Coaching teams

The new concept of coaching (smaller dedicated teams, trained with the OJTI (On-the-Job Instructor)) master classes (a course developed and delivered to train the OJTIs to apply a more "reflective" coaching style compared with the past) has proven its worth.

MUAC OAT provision

The EOS (Executive Operations Support) assistants have been further trained on the job to obtain full qualifications, and almost all assistants have now finished their training. In the area of the SOG (Special Operations Group), the first successful ATCO training was completed. Four additional air traffic controllers are as of now trained annually in the SOG.

Other training

The Training Organisation has also delivered training for the Central Supervisory Suite staff (Room Supervisors and Assistant Duty Supervisors (AtDSUPs), recurrent refresher training, adapted refresher and unit training and customised training in support of project implementations.

Remote TTR (Remote Simulator) training

The remote simulators were further used to bridge the lighter traffic days and to simulate medium to high traffic volumes and both advance the students in their training and enable operational air traffic controllers to feel confident in dealing with this traffic.

ALPI project moving into maintenance phase almost implemented

The developments of the ALPI (Advanced Learning and Involvement) project are in the process of being transferred into regular practice.

TRM training reintroduced at MUAC

In 2021, a new chapter of the Team Resource Management (TRM) training was successfully finished. The feedback from the participants was consistently positive. ATM training will continue to deliver TRM in this form on a regular basis.

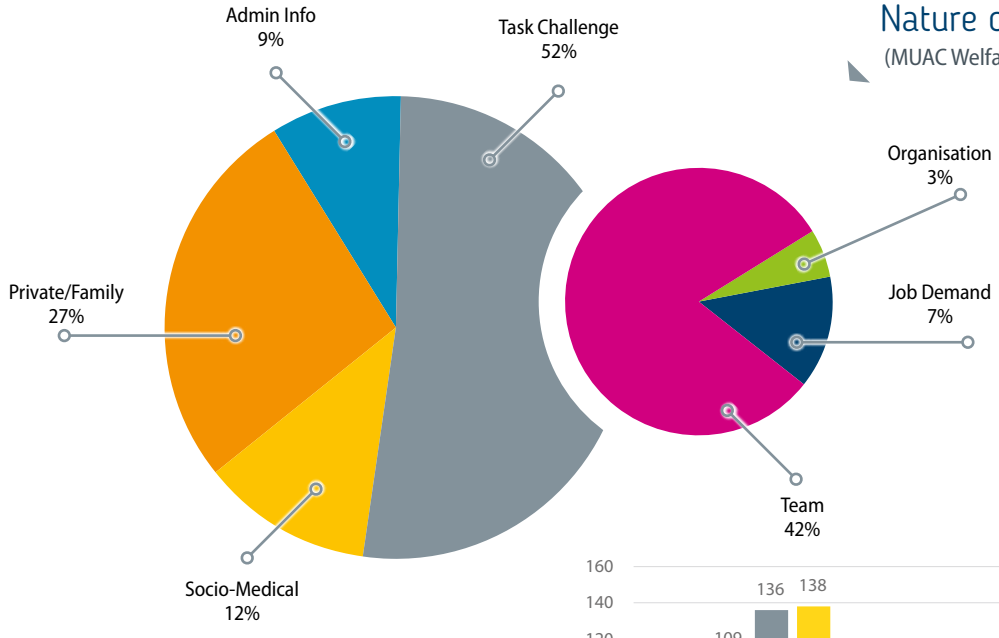
Training tools/software accelerated via MUSE Project

The development of suitable tools to improve the remote simulator and to optimise the training was initiated via the MUSE project.
and multi-sector scenarios, high-intensity training was created. Between 10 and 15 exercises per sector were created, which resulted in a total of 180+ hours of development.

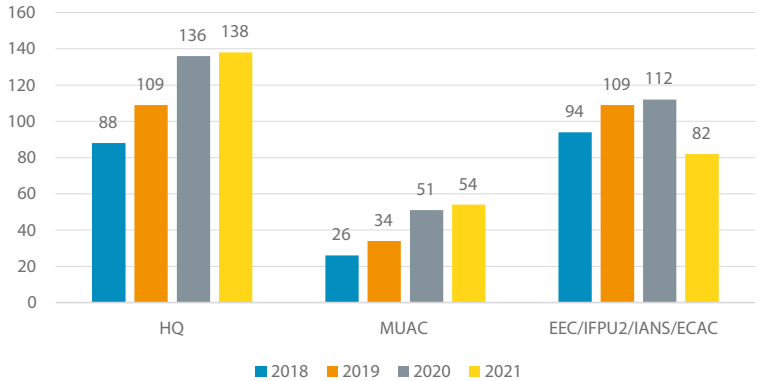
Welfare service

Since 2018, the MUAC Welfare Officer has been established as an essential function for the Centre. She offers confidential support and advice to all staff members (serving and retired, and their families) experiencing personal, family or professional difficulties, and helps resolve them.

Nature of issues - 2021
(MUAC Welfare Officer)



People supported 2018-2019-2020-2021
(Welfare Officers)



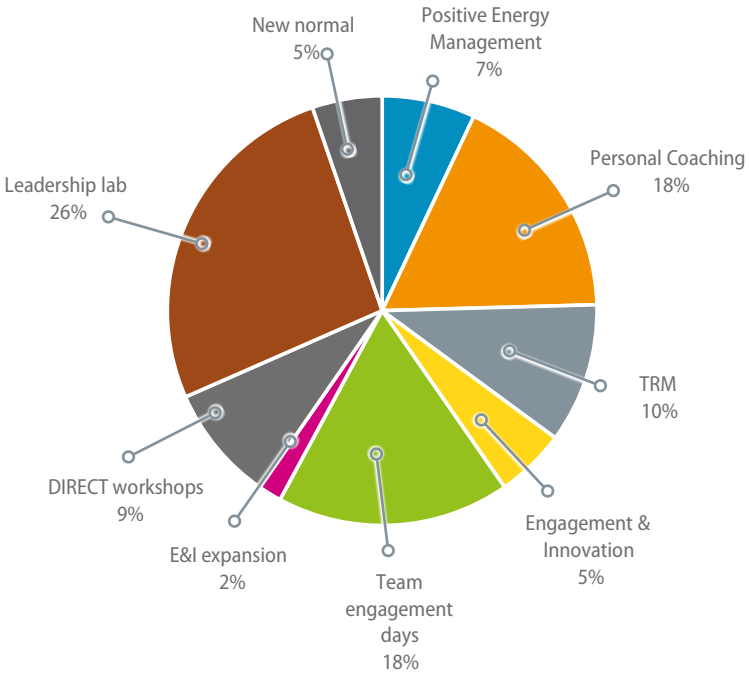
Human Performance

The effects of the pandemic on human performance, as they have been observed worldwide, were also felt in MUAC. This has presented unforeseen challenges for many employees and their line managers. Continuous investments by MUAC in human performance and resilience have proven beneficial in these circumstances. An additional boost has been provided by the Engagement and Innovation team who have focused on identifying the cultural traits that can help MUAC move forward cohesively in line with its own strategy and establishing initiatives that can create further opportunities for personal and team development.

The ultimate aim is to have engaged and resilient colleagues who continuously develop themselves to thrive in a dynamic environment and contribute to

1. Make MUAC a workplace of choice,
2. Ensure business continuity,
3. Provide outstanding services.

This can be achieved by working together with the right behaviours, living shared values and a shared sense of purpose. The alternative of allowing the interest of small groups and individuals to prevail over MUAC's interest as a whole is recognised to lead to stress, frustration and decreased motivation, which makes it difficult to speak openly and prevents the organisation reaching its collective full potential.



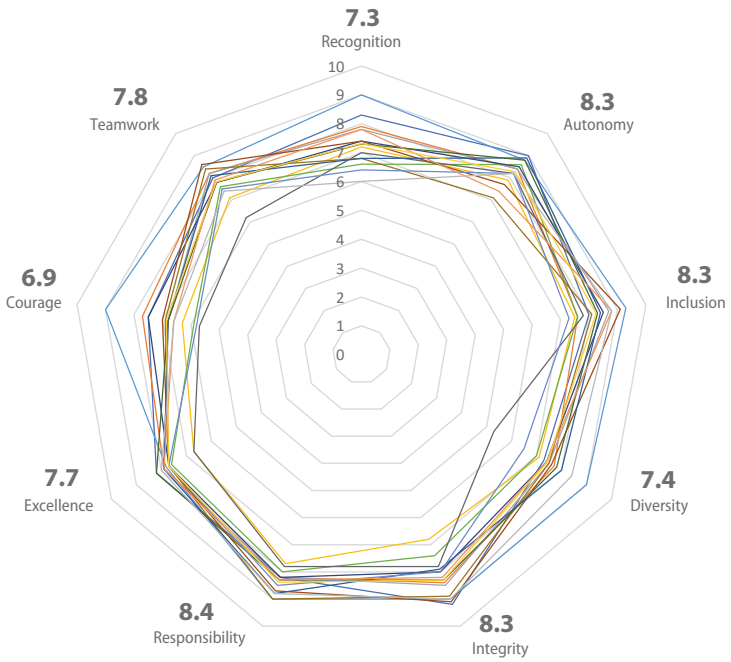
To achieve the shared values and behaviours several activities were promoted, such as Leadership lab, Team Engagement Days (TEDs), DIRECT values and strategy promotion via intranet with workshops, videos, podcasts, challenges and books.

Team Engagement Days

Some extra information about the TEDs and personal coaching is provided below.

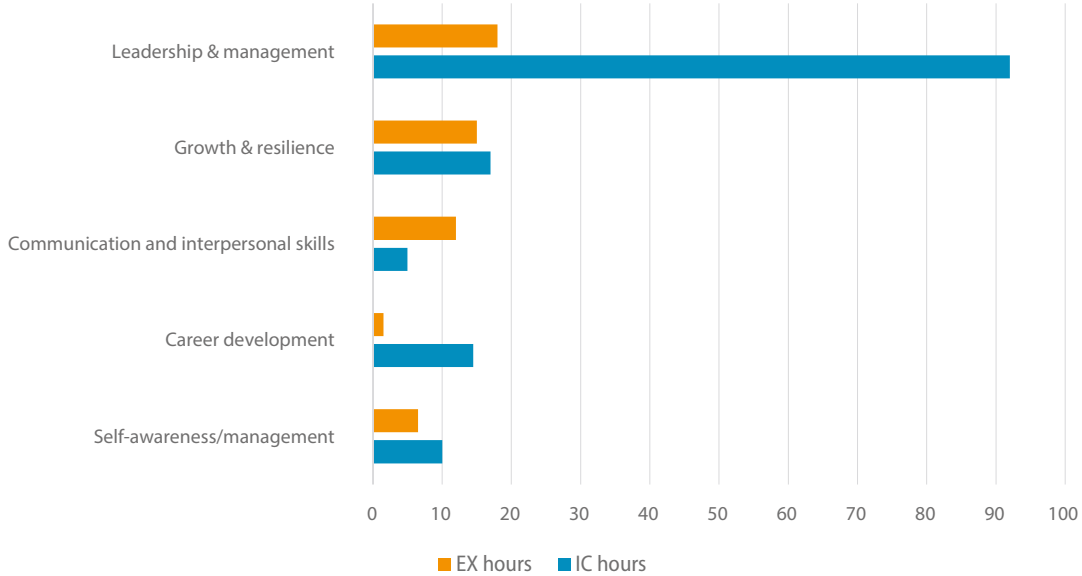
- Recognition – staff feel recognized by direct colleagues, line managers and customers for their contribution. However, some feel they are not recognised at organizational level, so some promotion is required. The lowest scores are often connected to the lack of promotions.
- Autonomy – the majority of MUAC staff feel autonomous and trusted to carry on their job. The constraints are mostly due to dependencies from other activities which require a greater understanding of the big picture.
- Inclusion/belonging – staff feel a sense of belonging to their team and MUAC and they are included in communication and decision-making processes at different levels. Most of the teams are invested extra efforts to reconcile the effects of social confinement on connections.
- Diversity – Staff appreciate diversity by acknowledging the value of other cultures, viewpoints, technical knowledge, interests and personalities. Some staff are aware about the need to recruit more diverse resources to complement the teams with different profiles, knowledge, and skills.
- Integrity – Trust and open sharing exists within the teams. Better interaction among teams can be improved with greater sharing to increase trust, mutual understanding and awareness about the big picture and the interactions.

- Responsibility – Staff share a high sense of ownership in terms of expert contribution. Increased awareness and responsibility for own behaviour is observed, however feedback is not always provided and it is sometimes not sufficient to achieve ownership. Shifting from high level of specialisation to increased career agility would be beneficial for increased staff performance.
- Excellence - Staff recognise "no one does what we do!" and they are often eager to go forward and do more thanks to their high sense of duty for a high quality of delivery and solidarity towards their colleagues. Teleworking has also contributed to increased productivity as well as workload. Many ideas for further improvement are being followed up as well, when workload allows.
- Courage - Within the teams staff dare to share problems to grow together and have the courage to challenge and be creative. They do not blame for mistakes and can deal with conflicts. Newcomers are agile in learning and daring in stepping outside of their comfort zone.
- Teamwork – Connection and cohesion exists within teams, especially when performing shared tasks. Understanding the big picture and how team goals contribute to realise MUAC is necessary to achieve cross-team collaboration.



Team Engagement Days

In 2021, 15 teams followed a specific format that the E&I calls Team Engagement Days. The following dimensions were measured through a questionnaire and further discussed as presented in the graph and table.



Personal coaching

An internal, certified coach, who is a staff member working on personal development (alongside other responsibilities), has performed a total of 138,5 hours (blue bars) with 33 staff - slightly increased compared to 2020. Two external coaches have performed a total of 53 hours (orange bars) with 13 staff, which is in the same order of magnitude of the years before.

Way forward

MUAC will continue its efforts and investments in personal/team development and resilience as we are convinced it is a cornerstone for staff and the organisation for the known and unknown challenges that lie ahead. MUAC is already preparing to approach strategic activities involving external stakeholders and the hybrid way of working with exploration and development of adaptive approaches to communication and collaboration that take into account the individuals, organization and national cultures.

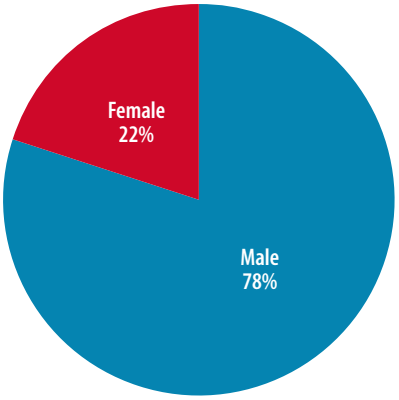
Social dialogue

Social dialogue activities in 2020 continued at both Agency and MUAC levels through the Agency consultation process, involving the trade unions and meetings of the Staff Committee (Servants), who represent MUAC staff with MUAC senior management.

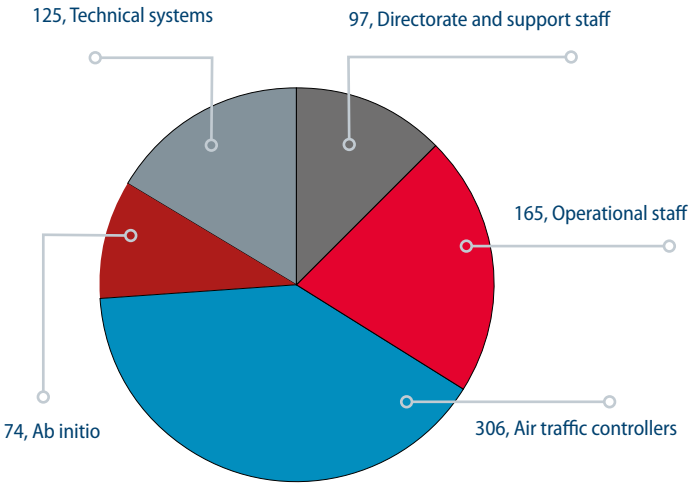
These discussions covered a number of different topics, but in particular focused on temporary provisions to contribute to savings in the context of the COVID-19 crisis. Discussions on temporary amendments to the working conditions of staff working in the Operations Room at MUAC were successfully concluded with a view to providing additional MUAC capacity at no cost when traffic levels recover. It is estimated that the amendments will generate savings for MUAC in an amount of M€4, thus providing budgetary relief for the MUAC budget for a four-year period (2021-2024).

Within MUAC, management provided regular feedback to the Staff Committee (Servants) on MUAC's main activities and its involvement within FABEC. On the basis of close dialogue between the Staff Committee and MUAC management, staff-related questions were raised, discussed and followed up.

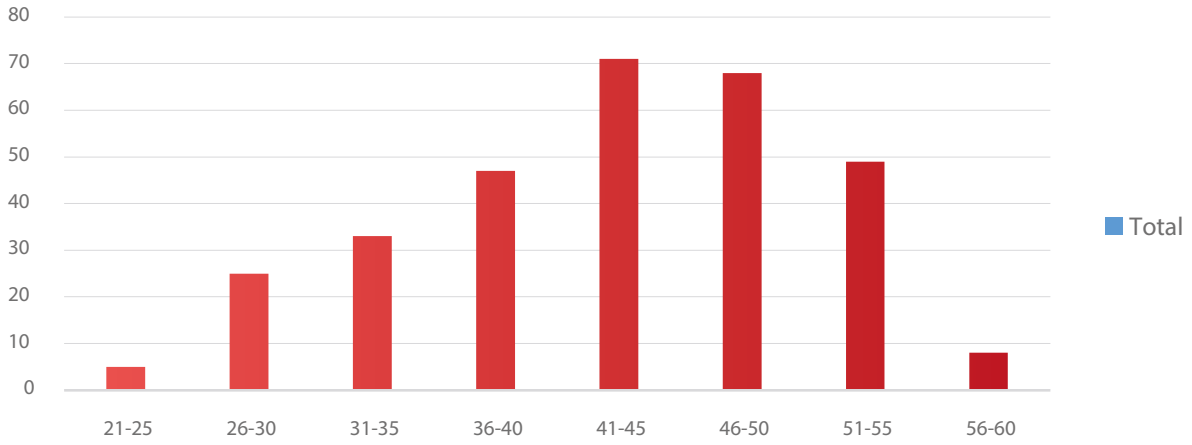
STAFF STATISTICS



GENDER DISTRIBUTION (31 December 2021)



BREAKDOWN OF STAFF IN THE VARIOUS CORE BUSINESS UNITS (31 DECEMBER 2021)



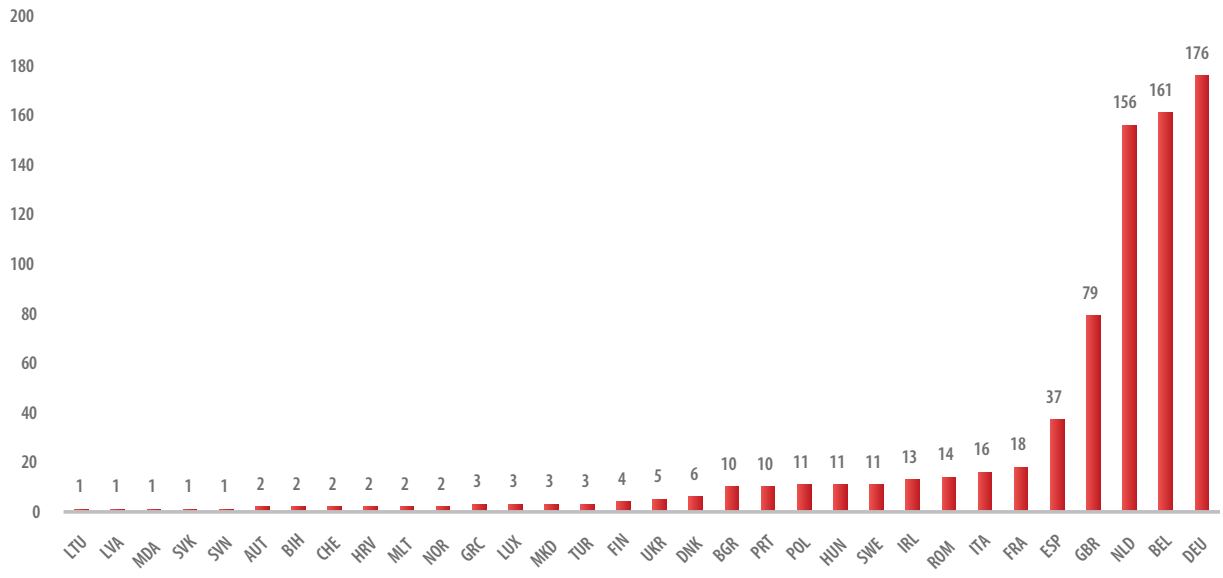
AGE AIR TRAFFIC CONTROLLERS - 31 December 2021

Air traffic controllers by sector group (2017-2021, 31 December)					
	2017	2018	2019	2020	2021
Brussels	107	112	112	113	116
DECO	98	96	94	91	94
Hannover	97	95	94	95	96
Special Operations Group	26	25	25	24	24
TOTAL	**328**	**328**	**325**	**323**	**330**

Staff intake and outflow (2017-2021, 31 December)	2017	2018	2019	2020	2021
Retirements	2	9	9	13	11
Other outflow*	6	6	13	11	21
TOTAL outflow	**8**	**15**	**22**	**24**	**32**
Recruitment (except air traffic controllers)	7	25	16	21	16
Student air traffic controllers (ab initio and conversion)	25	26	26	12	24
TOTAL intake	**32**	**51**	**42**	**33**	**40**

** 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.*

COUNT OF NATIONALITY - 32 nationalisaties on 31 December 2021



BUSINESS OUTLOOK

2021 followed 2020 as being an extraordinary year for the aviation industry. The effect of the global measures taken to combat the spread of the COVID-19 virus is plain to see. The aviation industry has been particularly hard hit, as airlines grounded their fleets and traffic levels plummeted. The more positive news is that, towards the second half of 2021, the traffic recovery started to materialise as airlines ramped up their schedules and the pent-up demand for travel was evident.

Given the pressure on all actors in the industry, MUAC is committed to playing its part. The Director of MUAC has been in regular contact with stakeholders to inform them about the situation at MUAC. Assurances have been given that the measures taken at the Centre will enable us to both continue to operate during the crisis and to provide the highest possible level of service throughout the recovery period and beyond. Indeed, MUAC developed a detailed traffic recovery plan that has guided the efforts to ensure that all staff and procedures, including the ATCO contingent, are well prepared for increased traffic levels as they materialise.

MUAC has been proactive in protecting the health of its employees and maintaining its operations in both civil and military operations since the outbreak of the COVID-19 crisis. Air traffic control is a critical national infrastructure and it is clear that the combined support of EUROCONTROL and the MUAC staff are critical for the full duration of the recovery period (however long that may be) and beyond, as airlines demand the highest level of service quality and availability from MUAC.

The MUAC Board has analysed the MUAC strategy and priorities, with the ultimate objective of providing the Centre with adequate tools and initiatives to adapt to the challenges of the coming years. Special attention is being given to developing a future system architecture that will be able to facilitate the other capacity and environmental improvements and shared systems that are being planned.

The new Agreement on the establishment of the Maastricht Decision-Making Body (MDMB) as the main executive body of MUAC, with increased decision-making power and more autonomy, is expected to be implemented in 2022. This should provide MUAC and the Four States with the necessary agility to make rapid, independent and sound decisions in this dynamic business environment.

The Board will promote further cooperation with key partners and stakeholders (e.g. FABEC, the NM, military partners, etc.), and will ensure that MUAC's role as a key player on the European ATM scene will enhance the solutions and agreements required to tackle the upcoming challenges.

In the medium to long term, "innovation" will remain a pivotal element of the MUAC strategy. As an outstanding service provider, MUAC has to be effective, and be at the forefront of technical and operational innovations, while at the same time remaining an attractive employer. In this regard, a number of initiatives and studies are on the table, including our CONOPS2030, MADAP2030 and ADSP programmes, all of which are key to our future development. In parallel, the Board will be promoting internal actions to ensure the best use of available platforms, fora and resources in order to come up with new creative, innovative and effective ideas.

The MUAC Board

Annual accounts

EUROCONTROL produces annual accounts which provide a consolidated view of the Agency's financial

situation and budgetary 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 from 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 2022.

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 have been prepared in accordance with the International Financial Reporting Standards (IFRS), on the basis of the provisions of the Financial Regulations of the Agency and their Rules of Application.

The Agency's policy regarding fixed assets is based on revised Director General's Decision XI/7(2020), dated 01/01/2020 and the Decision of Director CF (DCF/II/04 dated 01/02/2022). 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 (on the basis of ICAO rules adopted by the Permanent Commission).

Following a decision by the Provisional Council in November 2004, the Agency applies International Accounting Standard 38 (IAS 38) and, since 1 January 2006, capitalises only intangible assets which fully comply with this standard. Following this principle, only computer software for which EUROCONTROL owns intellectual property rights is capitalised.

As regards operating expenditure, contributions from the Four 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.

Investments are fully financed by bank loans. The residual value of fixed assets on the Balance Sheet is therefore 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 2021 Budgetary Accounts, which determine the amount of contributions due from the Member States in 2021, are based on the IFRS principles (with some exceptions). Similarly, the 2021 EUROCONTROL cost-base, which has been charged to the users through the route charge recovery cost mechanism, is also based on the IFRS principles (with some exceptions).
The exceptions to the IFRS are listed in Article 6 of the Rule of Applications of the Financial Regulations in the areas of contributions to social security schemes, compensation of national taxes and provisions.

BALANCE SHEET (NOMINAL VALUES)

ASSETS			
FIXED ASSETS		**2020**	**2021**
	Buildings & installations	32,141,318	32,663,348
	Equipment	18,753,279	16,355,807
	Vehicles	104,976	74,897
	Work in progress	43,695	1,688,407
	TOTAL FIXED ASSETS	**51,043,267**	**50,782,459**
CURRENT ASSETS			
	Contributions to be received	40,725,498	48,112,732
	Intercompany receivables		
	Deferred charge	12,949,482	15,852,782
	Other debtors	682,417	389,031
	TOTAL CURRENT ASSETS	**54,357,396**	**64,354,545**
OVERALL TOTAL		**105,400,664**	**115,137,004**

LIABILITIES			
CURRENT LIABILITIES		**2020**	**2021**
	Contributions to be reimbursed to Member States	2,651,836	12,278,984
	Deferred income	39,376,960	47,472,000
	Other creditors	5,164,359	3,368,045
	Accrued charge	1,820,188	937,863
	Intercompany payables	5,344,053	297,653
	TOTAL CURRENT LIABILITIES	**54,357,396**	**64,354,545**
OTHER LIABILITIES			
	Loans > 1 year	51,043,267	50,782,459
	TOTAL OTHER LIABILITIES	**51,043,267**	**50,782,459**
FINANCIAL POSITION			
	TOTAL FINANCIAL POSITION	**-**	**-**
OVERALL TOTAL		**105,400,664**	**115,137,004**

STATEMENT OF FINANCIAL PERFORMANCE (NOMINAL VALUES)

	2020			2021		
	GAT	OAT	TOTAL	GAT	OAT	TOTAL
COSTS						
Remunerations	163,013,793.03	11,146,242.26	174,160,035.29	161,579,625.53	12,221,336.01	173,800,961.54
Revenue related to remunerations	-	-	-	4,990,690.77	-	4,990,690.77
Revenue related to KLU	-1,667,599.71	-114,023.91	-1,781,623.62	-1,670,752.61	-126,370.07	-1,797,122.68
Revenue related to SESAR 2020	-11,639.63	-795.87	-12,435.50	-	-	0.00
Revenue related to SAS-2	-692,640.00	-47,360.00	-740,000.00	-890,486.61	-67,353.39	-957,840.00
Revenue related to SAS-3	-	-	-	-988,967.75	-74,802.17	-1,063,769.92
Revenue related to NL OAT service provision	-2,366,551.08	-161,815.46	-2,528,366.54	-2,297,055.96	-173,741.54	-2,470,797.50
Revenue related to NL Airspace Management Function	-426,626.69	-29,171.06	-455,797.75	-407,025.25	-30,786.01	-437,811.26
Revenue related to DECEA	-252,584.69	-17,270.75	-269,855.44	-255,549.41	-19,328.89	-274,878.30
Revenue related to other services	-347,744.80	-23,777.42	-371,522.22	-204,631.24	-15,477.61	-220,108.85
Revenue related to services	-4,097,786.89	-280,190.56	-4,377,977.45	-5,043,716.21	-381,489.62	-5,425,205.83
STAFF COSTS	157,248,406.43	10,752,027.79	168,000,434.22	159,855,847.48	11,713,476.32	171,569,323.80
Staff-related costs: training and travel costs	3,468,826.80	237,184.74	3,706,011.54	3,064,304.04	166,295.09	3,230,599.13
External assistance	6,738,295.24	460,738.14	7,199,033.38	6,169,302.18	334,798.59	6,504,100.77
Accommodation	3,911,138.03	267,428.24	4,178,566.27	4,202,850.19	228,082.25	4,430,932.44
Communications	1,738,448.04	118,868.24	1,857,316.28	1,327,888.83	72,062.49	1,399,951.32
Data processing	6,424,504.00	439,282.33	6,863,786.33	6,667,448.05	361,832.20	7,029,280.25
General administration	333,587.26	22,809.38	356,396.64	387,120.70	21,008.45	408,129.15
Finance & Insurance	344,962.30	23,587.17	368,549.47	371,388.04	20,154.66	391,542.70
Unrecoverable VAT	5,175.71	353.90	5,529.61	8,249.37	447.68	8,697.05
Miscellaneous revenue	-32,356.13	-2,212.39	-34,568.52	-13,022.17	-984.95	-14,007.12
OPERATING COSTS	22,932,581.26	1,568,039.74	24,500,621.00	22,185,529.23	1,203,696.46	23,389,225.69
DEPRECIATION COSTS	9,100,731.18	622,272.22	9,723,003.40	5,920,352.24	321,288.46	6,241,640.70
COSTS OF CAPITAL	144,066.50	9,850.70	153,917.20	169,500.04	9,198.51	178,698.55
TOTAL COSTS	**189,425,785.37**	**12,952,190.45**	**202,377,975.82**	**188,131,229.00**	**13,247,659.74**	**201,378,888.74**
INTERNAL TAX	**-47,592,202.20**	**-3,470,310.49**	**-51,062,512.69**	**-47,561,919.45**	**-3,597,422.62**	**-51,159,342.07**
CONTRIBUTIONS	**141,833,583.16**	**9,481,879.97**	**151,315,463.13**	**140,569,309.55**	**9,650,237.12**	**150,219,546.67**
INEA revenues	-6,112,697.55	-	-6,112,697.55	-	-	-
CONTRIBUTIONS (including INEA revenues)	**135,720,885.61**	**9,481,879.97**	**145,202,765.58**	**140,569,309.55**	**9,650,237.12**	**150,219,546.67**

GLOSSARY OF ACRONYMS

A

Ab Initio	Air Traffic Control student
ACE	ATM Cost-Effectiveness
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ADSP	ATM Data Service Provider
AIRAC	Aeronautical Information Regulation and Control
AMC	Airspace Management Cell
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATCO	Air Traffic Controller
ATC2ATM	Air Traffic Control to Air Traffic Management
AtDSUP	Assistant Duty Supervisor
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATM/CNS	Air Traffic Management/Communications, Navigation and Surveillance
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services

B

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

C

CAA	Civil Aviation Authority
CAMAR	Conflict Alert Message Analysis and Reporting
CFSP	Computerised Flight plan Service Provider
CNS	Communications, Navigation & Surveillance
CO2	Carbon dioxide
COC	Certificate of Competence
CPDLC	Controller-Pilot Data Link Communications
CRSTMP	Capacity, Routeing, Staffing, Equipment, Management, Special Event
CSS	Central Supervisory Section
CWP	Controller Working Position

D

DNV GL	Det Norske Veritas Germanischer Lloyd

E

EC	European Commission
ENAC	Ecole Nationale de l'Aviation Civile
EOS	Executive Operations Support
EPP	Extended Project Profile
EU	European Union
EUROCONTROL	European Organisation for the Safety of Air-Navigation

F

FAB	Functional Airspace Block
FABEC	Functional Airspace Block Europe Central
FC-M	FUA Cell MUAC
FDPS	Flight Data Processing System
FIR	Flight Information Region
FRA	Free Route Airspace
FTE	Full-Time Equivalent
FUA	Flexible Use of Airspace

G

GAT	General Air Traffic

H

H24	Available 24 hours a day, 7 days a week

I

IAS	International Accounting Standards
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
IOP	Interoperability
ISO	International Organization for Standardization

K

KPI	key Performance Indicator

L

LVNL	Luchtverkeersleiding Nederland

M

MCG	Maastricht Co-ordination Group
MDMB	Maastricht Decision Making Body
MOST	Maastricht Operational Statistics Tool
MSP	Multi Sector Planning
MUAC	EUROCONTROL Maastricht Upper Area Control Centre

N

NATO	North Atlantic Treaty Organization
NM	Nautical Miles Network Manager

O

OAT	Operational Air Traffic
OJT	On-the-Job Training
OJTI	On-the-Job Training Instructor
ONL	Online
OPS	Operations

P

PABI	Post-OPS Analysis and Business Intelligence
PCP	Pilot Common Projects
PRC	Performance Review Commission
PRI-ATS	Primary Air Traffic System

R

RAT	Risk Analysis Tool
REDES	Route Efficiency in approaching DEStination
RESTR	Route Efficiency in Straightness of Trajectory
RNLAF	Royal Netherlands Air Force
RP3	Reference Period 3 (2020-2024)

S

SAS	Shared ATS System
SES	Single European Sky
SESAR	Single European Sky ATM Research
SMI	Separation Minima Infringements
SMS	Safety Management System
SOG	Special Operations Group
SOT	Sector Opening Time
STCA	Short Term Conflict Alert
STATFOR	EUROCONTROL Statistics and Forecast Service

T

TPI	Traffic Predictions Improvements
TTI	Test and Training Integration

U

UAV	Unmanned Aerial Vehicle
UIR	Upper Information Region
US	United States

V

VAT	Value Added Tax
VDL	VHF Digital Link

W

WO	Weather, Other

X

XMAN	Cross-Border Arrival Management
4NSA	Four States' National Supervisory Authorities

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50 YEARS OF **PASSION** AND **INNOVATION**