Operations Control Centre perspective

Future of airline operations

SESAR

Lufthansa Systems

Sabre Airline Solutions

AIRBUS

This brochure was developed based on the results provided by the OCC project as part of the SESAR programme.

This project was managed by a consortium led by Airbus in which Lufthansa Systems, Sabre Airline Solutions and Airbus Defence and Space were involved in the subjects presented in this brochure.

Extended flight plan

Advanced flexible use of airspace

User driven prioritisation process

Operational improvements for Flight Operations Centre (FOC) - usually known as Airline Operations Centre (AOC) or **Operations Control Centre (OCC)** - were developed during the last five years of the **Single European Sky ATM* Research** (SESAR 1) programme.

SESAR aims to modernise the Air Traffic Management system with a view to:

› increase safety
› reduce environmental impact
› reduce ATM costs
› increase airspace capacity

The following operational improvements will allow airlines to increase the efficiency of their operations.

*ATM: Air Traffic Management

Extended flight plan

The **EFPL*** represents a new type of flight plan with extended data that will be aligned with upcoming international standards to replace the ICAO 2012 flight plan.

* EFPL: Extended Flight Plan

Extended flight plan

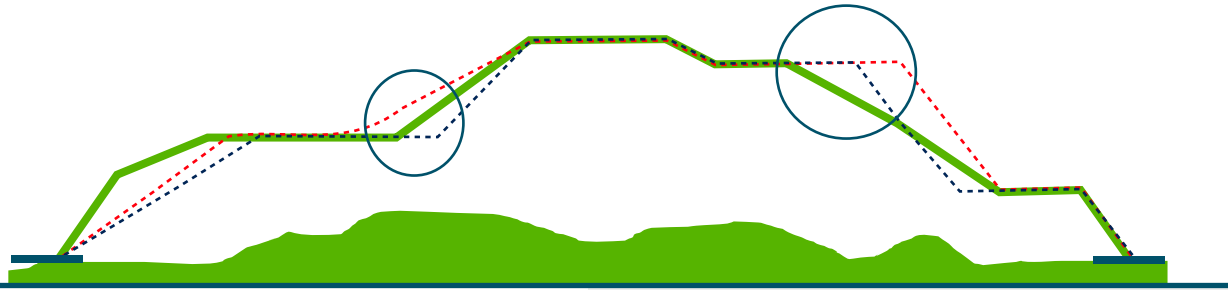
Current limitations

Today, an Aircraft Operator's flight plan delivered through ICAO FPL 2012 includes only limited information of the 4D trajectory.

Both the Network Manager (Eurocontrol) and Air Traffic Control receive **the flight plan and recalculate** its profile resulting in misaligned trajectories.

Key parameters about exact position, altitude, time at a waypoint, or flight specific performance data are missing which often leads to the following:

- **Flight plan wrongly rejected**
- **Flight plan wrongly accepted**



Therefore, the Operational Flight Plan released to the crews in some cases does not provide the optimum vertical profile. This is due to the fact that the trajectory is refined to get it accepted by both parties.

Some steps climb or extension of the beginning of descent like those illustrated in this figure may also be avoided.

- **Air Traffic Control**
- **Network Manager**
- **Operational Control Centre**

Extended flight plan

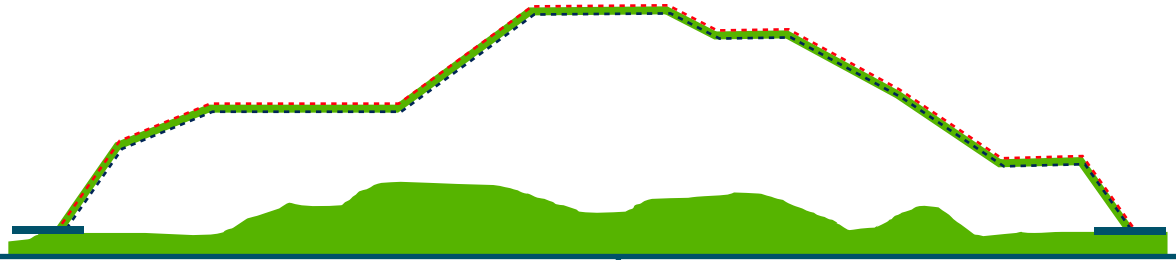
Solution developed

Thanks to the sharing of EFPL data during the planning phase, these misalignments should gradually disappear. The final goal of using the EFPL is **to align as much as possible** the trajectories managed by all the concerned actors.

Extended flight plan mainly provides the following information:

- **4D trajectory**
  position, altitude, time at every waypoint and additional information such as aircraft mass and speeds, temperature, wind at every waypoint
- **Flight specific performance data (optional information)**
  unconstrained climb and descent profiles

Converging trajectory views with use of Extended Flight Plan data



The participation of the following airlines was essential to validate this improvement: Austrian Airlines, Air France, British Airways, easyJet, EL AL, Germanwings, HOP!, Lufthansa, Lufthansa Cargo, Lufthansa Cityline, Novair, TAP, Thomas Cook Group and Turkish Airlines.

Expected benefits

- **Alignment of airlines and ATM planned trajectories**
- **Traffic predictions enhancement**
- **Demand/capacity network calculations improvement**
- **Potential decrease of 15% for the rate of rejected flight plans**

Extended flight plan

Changes in the current operational procedures

The procedures for the flight dispatcher during the planning phase should remain the same.

With the use of EFPL, trajectory calculation and acceptance processes become more optimized. Particularly the dispatcher will have a better understanding of the errors and solve them more efficiently in the case of rejected flight plans.

Changes in interface/systems

The EFPL file will be in a new data format based on XML.

The flight planning system will be upgraded to support the new format and to share the extended flight plan data with the Network Manager.

Roadmap

Deployment is expected to start from Spring 2017 and will gradually integrate Air Navigation Service Providers until 2021*.

* based on ATM master plan edition 2015

Advanced flexible use of airspace

AFUA* aims to provide a more flexible management of airspace reservations in response to civil and military airspace user needs.

Airspace status changes are shared in real-time with all concerned users, in particular Network Manager, Air Navigation Service Providers and Aircraft Operators.

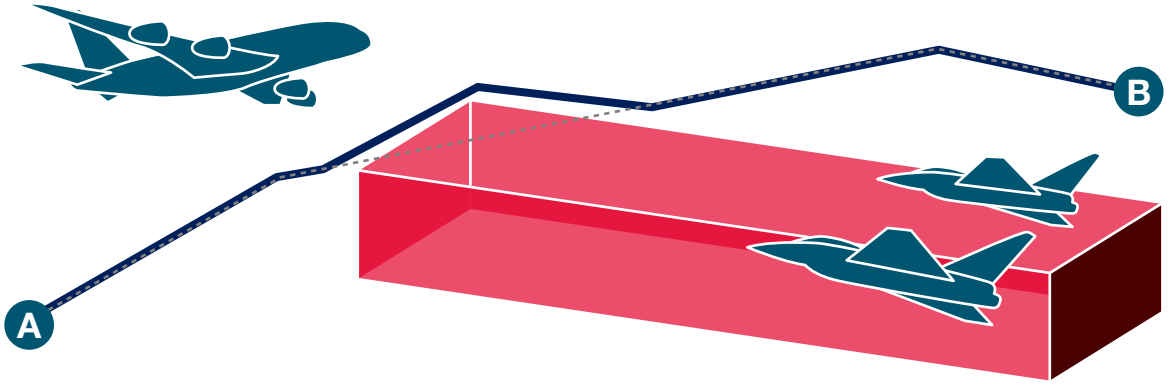
* AFUA: Advanced Flexible Use of Airspace

Advanced flexible use of airspace

Current limitations

Currently, airspace design leads military operators to reserve a whole airspace block even if it is not fully used in space and time.

Consequently, civil operators are constrained to deviate from their preferred trajectories as illustrated, and are not aware in real-time about airspace availability.



Current flight planning

Advanced flexible use of airspace

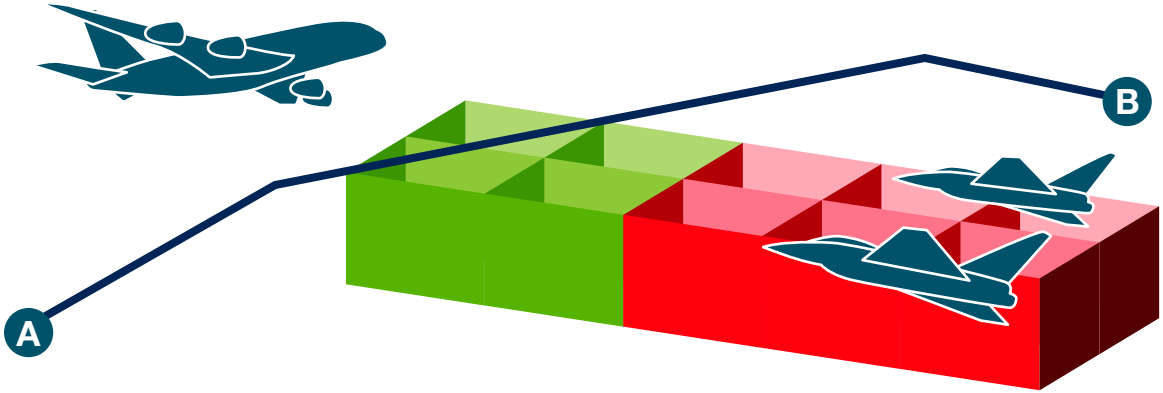
Solution developed

Advanced Flexible Use of Airspace consists of configuring **modular airspace blocks** to enable flexible airspace reservation.

It is also about **sharing the airspace status in real-time.**

The new airspace configuration enables military operators to leave free the green modules by reserving only the red airspace blocks as illustrated.

Thanks to AFUA, civil operators will get increasing opportunities to plan more **efficient trajectories.**



Expected benefits

- Better use of existing capacities
- More flexibility
- Higher cost effectiveness by 1.1%
- Higher environmental and fuel efficiency by 1.5%

Flight planning optimisation

Advanced flexible use of airspace

Changes in the current operational procedures

During both flight planning and execution phases, the flight dispatcher will receive airspace status data in real-time by the network manager. This data will permit to optimise trajectories of the eligible flights.

Changes in interface/systems

In order to take advantage of the AFUA concept, the flight planning and operations control sytems will develop to enable the identification of those eligible flights.

Flight Operations Centre

Roadmap

Started in 2015, the deployment period is planned to end in 2021*.

* based on ATM master plan edition 2015

User driven prioritisation process

UDPP* aims to provide more flexibility to airlines in case of flight delays in capacity constrained situations such as adverse weather or industrial action.

It takes place in a **Collaborative Decision Making** context.

* UDPP: User Driven Prioritisation Process

User driven prioritisation process

Current limitations

Whenever demand exceeds air or ground capacity limits, ATFM* slots are issued to avoid airspace overload.

Currently, airlines have limited opportunities to reduce extra costs due to delays.

UDPP presents two improvement steps:

Step 1 is linked to the ATFM **slot swapping** already being used by some airlines in operations and enhanced by the interface tool of the network manager.

Step 2 has been newly introduced in SESAR - airline flight prioritising

* ATFM: Air Traffic Flow Management

User driven prioritisation process

Solution developed

In order to improve disruption management in case of congestion, UDPP step 2 enables the airline to **provide priorities for any of its flights.**

UDPP introduces **two new features:**

FDA (Fleet Delay Apportionment)
consists of attributing priority numbers per flight based on flight value in order to redistribute the fleet delay impacted by the capacity constraint.

SFP (Selective Flight Protection)
allows an airline to protect a flight enabling its departure or arrival on time, or near on time, with the use of operating credits from its other flights. Those other flights get suspended and pushed at the end of the constraint period.

Both features are defined to ensure that all stakeholder needs are respected with **equity** and without effect to the ATM system quality.

The following associations and airlines played a key part in this development: ELFAA, HOP!, Swiss, Austrian Airlines, EL AL, Turkish Airlines, British Airways, Air France-KLM and IATA.

Expected benefits

- **Informed decision**
- **Improved efficiency**
- **Higher flexibility**
- **Increased profitability: potential reduction of 10% - 15% of the total cost of delay**

User driven prioritisation process

Changes in the current operational procedures

Although UDPP provides significant flexibility and efficiency, it remains optional for the airlines.

In FDA and SFP processes, priority numbers and operating credits data are exchanged by the OCC with the applicable ATM stakeholders. As a result, a new fleet delay distribution is calculated and shared back with the airline.

User driven prioritisation process

Changes in interface/systems

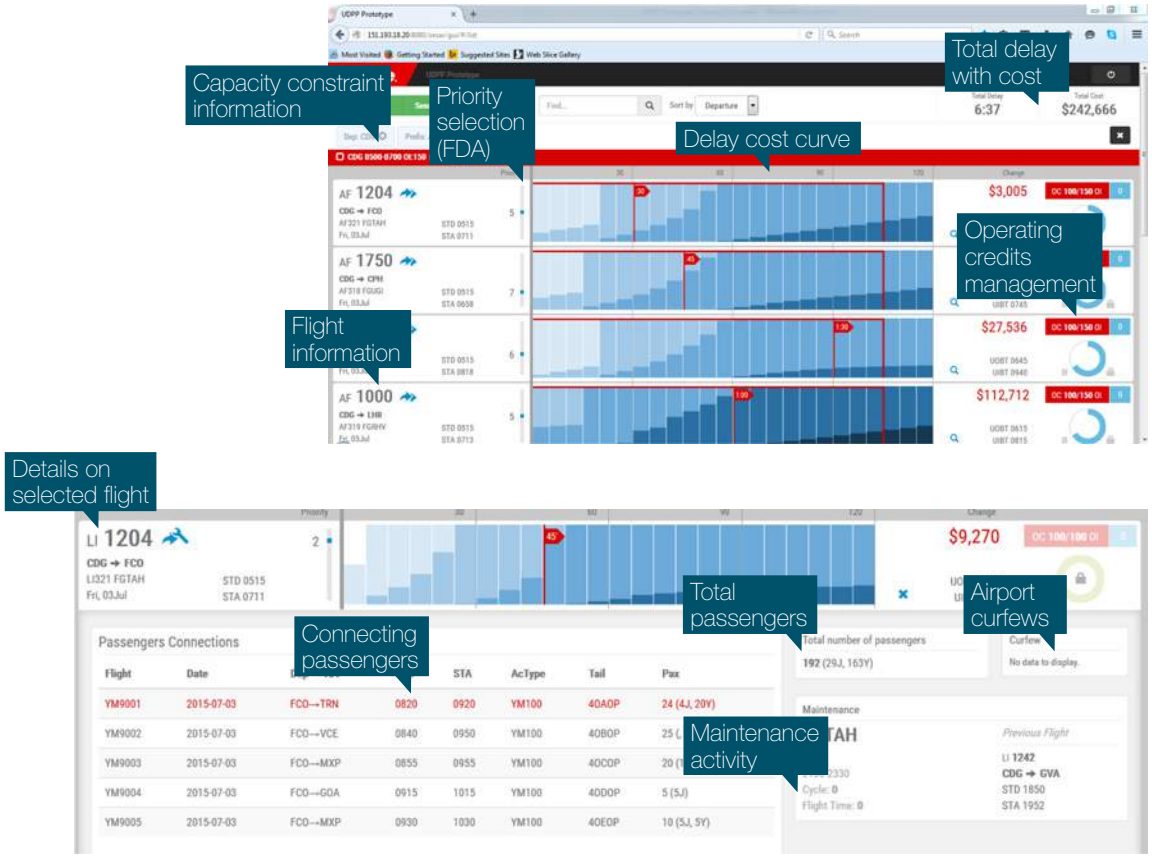
An interface between the OCC and the ATM stakeholder applying UDPP is to be made available for data exchange.

An airline tool can also more efficiently support decision-making by building a model of each flight's costs which vary in accordance with the delay, as illustrated.

Roadmap

- **UDPP Step 1** already started its deployment in 2016 and at Charles de Gaulle airport, France since 2014
- **UDPP Step 2** deployment period is expected to start from 2022 up to 2025

Airline tool prototype



Source: Sabre Airline Solutions

Conclusion

EFPL, AFUA and the first UDPP step improvements have reached an adequate maturity level for going to the next steps: industrialization and implementation.

Airlines should contact flight planning providers and Eurocontrol for the installation of interfaces or tools in order to benefit from those improvements.

The SESAR OCC project team also contributed to other subjects in the framework of SESAR 1 programme that have not yet reached maturity. Although the continuity of these improvements is granted through the SESAR Deployment and SESAR 2020 programmes, involvement by airlines is key to an appropriate development.

A collaborative harmonisation work has been launched between the US and the EU via an ATM group in order to reach interoperable standards and to allow ICAO to achieve global harmonisation.

The improvements presented by the SESAR OCC project team were achieved thanks to a close collaboration with airlines identified by Eurocontrol and the SESAR Joint Undertaking.

Acronyms

4D Four Dimensional

AFUA Advanced Flexible Use of Airspace

AO Aircraft Operator

AOC Airline Operations Centre equivalent to “FOC and OCC”

ATFM Air Traffic Flow Management

ATM Air Traffic Management

CTOT Calculated Take-off Time

EFPL Extended Flight Plan

FDA Fleet Delay Apportionment

FOC Flight Operations Centre

FPL Flight Plan

ICAO International Civil Aviation Organization

OCC Operations Control Centre

SESAR Single European Sky ATM Research Programme

SESAR Programme
The programme which defines the Research and Development activities and Projects for the SJU

SFP Selective Flight Protection

SJU SESAR Joint Undertaking (Agency of the European Commission)

UDPP User Driven Prioritisation Process

XML Extensible Markup Language