

ACL, NATS and the IRG: Preparing for a challenging summer

As UK and European Airspace become more congested and airports look to squeeze maximum opportunity from their runway, we look at how NATS and ACL are working together through the Industry Resilience Group to better plan for the summer.

Aircraft cannot simply fly in straight lines between two points. The skies above our heads are made up of a mix of controlled, uncontrolled and military airspace. Almost all commercial airliners fly through controlled airspace where Air Traffic Control monitor and control in which direction, how fast and at what altitude each flight can fly to keep passengers safe.

The controlled airspace above the United Kingdom is a set of pre-designated corridors that aircraft must follow (similar to the motorway system for vehicles). It was originally designed in the 1960s and in the main has remain unchanged for 50 years. As the demand for Air Travel has increased since the 1960s, certain parts of the airspace network above the UK has come under significant pressure and it is at these “hotspots” within the airspace network that the flow of air traffic may have to be regulated by Air Traffic Control (think dot matrix signs limiting the speed limit on a congested motorway!). The application of a regulation in a particular air traffic sector can lead to delays to flights planning to fly through that sector.

An Olympic exercise

In the lead up to the London 2012 Summer Olympic Games, the UK’s National Air Traffic Services (NATS) raised concern that the anticipated additional air traffic operating through the airspace over the South East of England during the Olympic Games could compound air traffic capacity issues already being experienced in and around the busy London Terminal Manoeuvring Area (LTMA). After a lengthy consultation, more than 40 airfields within an area stretching from Bournemouth to Birmingham to East Anglia to Kent were designated as Coordinated for the three-week period of the Games. Airport Coordination Limited (ACL) as the incumbent Slot Coordinator in the UK was appointed as the Coordinator for these forty plus airfields and set about coordinating the flight schedules for flights using controlled airspace during the Olympic Games at each of these airports. ACL were providing regular schedule listings to NATS for all of the Coordinated airports in the lead up to and during the Olympic Games and from these schedule listings NATS were able to predict with relative accuracy where the potential airspace “hotspots” were going to be, allowing them to implement mitigation actions accordingly. NATS were able to successfully deliver an increase in traffic with minimal delays during the period of the London Olympics.

ACL have been widely recognised as the go to source of information when planning for special events affecting the UK’s airports. The success of the London Olympics demonstrated to NATS that having accurate schedule data prior to the day of operation allowed them to plan effective mitigation actions which helped to reduce delays. So, when NATS and ACL were invited into the Voluntary Industry Resilience Group (VIRG), a group set up to explore the resilience of the UK’s aviation sector, it was inevitable that the London Olympics experience would be raised.

The coordination cycle of airport and airline schedules is a very intricate process that has many ups and downs and ongoing changes in the demand profile. The VIRG embarked upon trying to understand from ACL how the coordination cycle works and if any useful information could be extracted from ACL's schedules to highlight potential air traffic hotspots in advance. ACL coordinate approximately 1.3 million flights operating from the UK's airports each year and NATS control approximately 2.5 million flights (including overflights) operating through UK airspace each year.

With airspace modernisation in the UK some years away, the VIRG was changed into the Industry Resilience Group (IRG) with a remit to find ways of improving the resilience of the existing airspace infrastructure and the processes around building and delivering flight schedules.

For the Summer 2018 season, ACL and NATS worked together to create some basic high-level illustrations to show the changes in demand for the main directional flows in/out of the UK airspace versus the previous Summer. The process began late in the coordination process and had a limited impact on helping NATS to combat the emerging hotspots, although did indicate the collaborative possibilities between NATS and ACL.

Planning for summer 2019

For the Summer 2019 season the process of analysing changes to directional flows began shortly after initial coordination, five months before the beginning of the Summer 2019 season. The four iterations performed by ACL and NATS before the season start helped to refine where the hotspots within the UK airspace were likely to be seen. Alongside this collaborative analysis, NATS were developing their own airspace model that allowed the ACL schedule data to be analysed providing detailed information of air traffic hotspots by time of day and by day of week.

The role of ACL in this process was to provide **detailed schedule data for 26 UK & Republic of Ireland (ROI) airports** to be combined with NATS capability at key points in the run up to the start of the season. ACL's experience provided industry context and understanding to the analysis, a result of their unique proposition and close relationships with airlines and airports. This expertise increases the depth of information provided to NATS to ensure they can better prepare for the summer season.

Each iteration was made up of thousands of data entries providing information on the number of flights operating between airports. This, in combination with NATS' own data allows airspace 'hot spots' to be identified ahead of time. Further analysis by week, weekday and time provide extended dimensions to the analysis, allowing NATS and the industry to understand the impact of the new schedule for the upcoming season and plan for expected congestion.

Working in collaboration

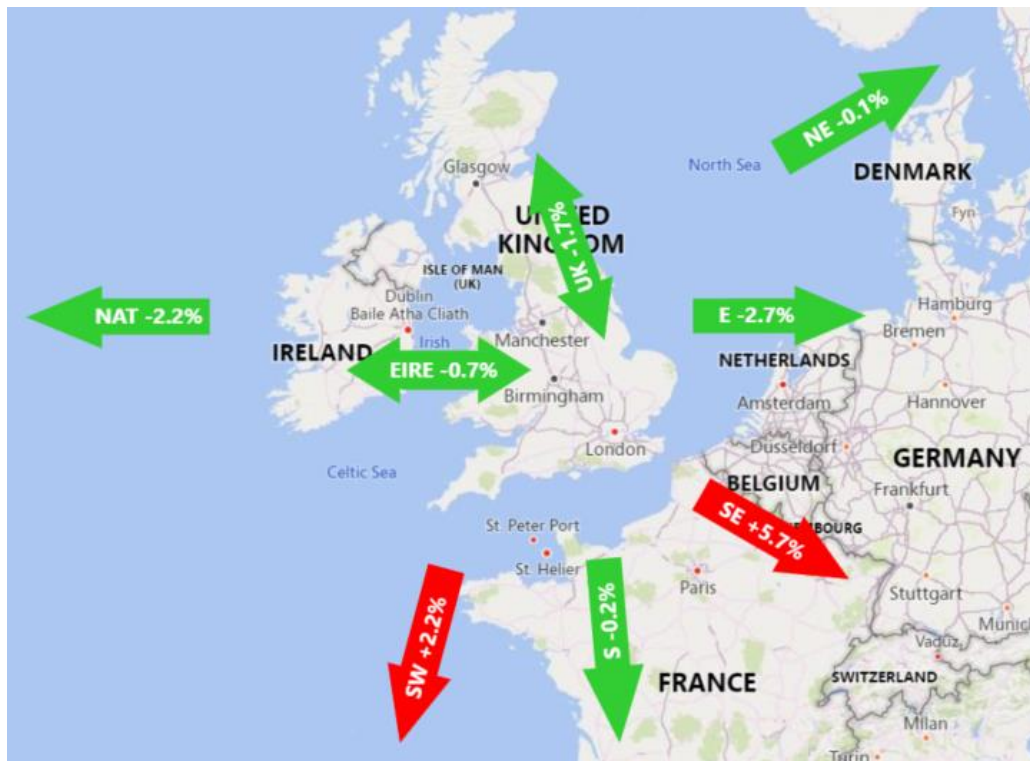
ACL provided Summer 2019 schedule data captured at 4 iterations covering the period from initial coordination in November to the beginning of the summer season. These iterations allowed NATS to understand the expected trends and see how these developed until the start of the season.

ACL also completed data analysis in order to produce succinct slides for the IRG to describe the trends seen in the previous summer season and to allow the industry to understand and prepare for forecasted trends for the upcoming summer season. ACL additionally reacted to issues identified in the data to carry out ad-hoc analysis, providing data and analysis looking in detail at specific topics raised such as trends in aircraft upgauging across the UK.

Delivering meaningful output for the industry

The outputs provided for Summer 2019 were significant in allowing the industry to better prepare for a busy summer season. The data showed a **0.4% growth** against the previous summer, amounting to an increase of over 6,000 movements. Growth was strongest in the Republic of Ireland (+3.6%), with movements at London airports also higher than the previous summer (+0.5%).

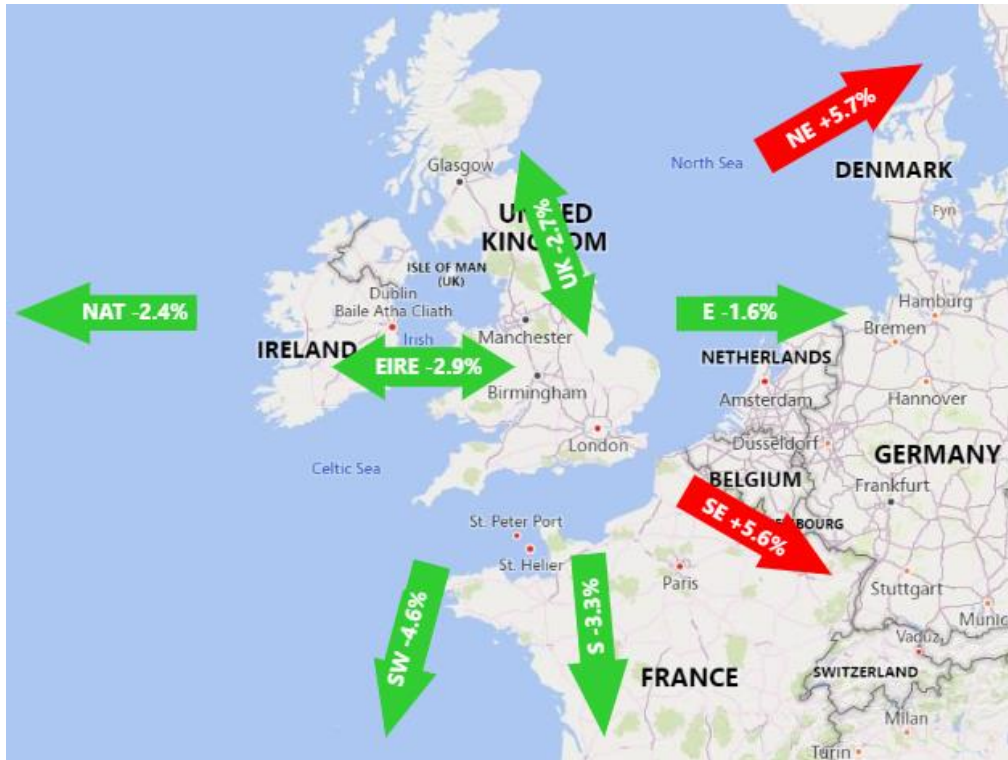
Significantly for NATS, there was strong South-East axis growth (+5.7%) which indicated further congestion expected in an already busy airspace. There was however a decline in traffic on the East axis; knowledge of these trends allowed NATS and the industry better prepare for the airspace challenges ahead.



ATC Routing traffic forecast for Summer 2019 as of February 20, 2019.

For Summer 2020, in addition to the schedule data ACL developed further analysis to provide insights and to make the process simple and easily understood. Using Power BI reporting to update hotspot analysis based on iterative data has enabled an increase in the efficiency and regularity of the updates. The result of this is an increase in the visibility of schedule and trend changes for NATS and the IRG, refining the information available as the start of the summer season approaches.

Initial Summer 2020 analysis taken at the end of November showed movements **growth of 0.7%** for the upcoming season. Expected growth for 2020 was driven primarily by the rise in scheduled flights with a South-East ATC routing which increased by over 23,000 movements. Growth on the South-East axis has been a historic issue for UK airspace, and so advance warning for the upcoming summer allows the industry to react to the forecasted increase in demand.



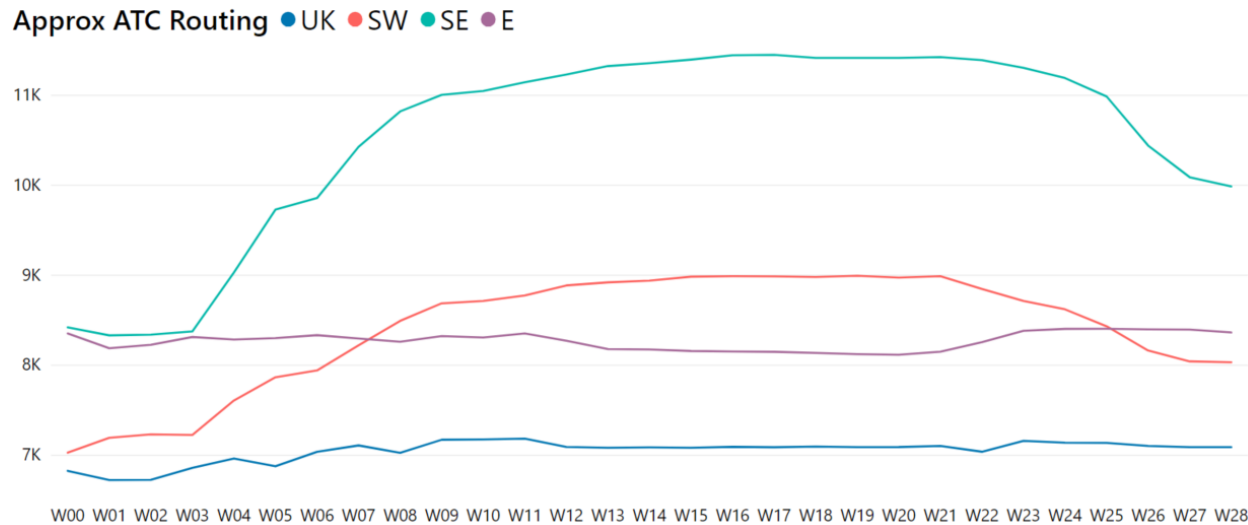
ATC Routing traffic forecast for Summer 2020 as of February 3, 2020.

The picture had changed significantly at the second data iteration. Data updates now show a movement decline of **-1.1%** against the previous summer, demonstrating how regular provision of schedule data is essential due to the volatility of schedule changes that can occur.

Growth on the South-East axis has now subsided to 7,700 additional flights for Summer 2020, corresponding to 2.5% growth against last summer. The NE axis shows growth of 4.2% and is highlighted as causing potential ATC issues. Despite this growth the SE axis remains the primary focus, as 23.6% of all flights operate in the SE axis meaning that any growth corresponds to a significant increase in the number of planes airborne.

In addition to observing overall movements and axis growth, further analysis allows us to provide information at a regional and airport level. This analysis shows decline in movements in all UK and ROI regions, except for growth in Scotland (3.9%) which is driven by a rise in movements at Aberdeen and Edinburgh airports. London airports are often an industry focus, with a decrease of 0.2% against last summer seen in the most recent update.

ACL have developed further analysis considering seasonality of movements on each axis. Viewing movements on each of the busiest axes by week of the season shows a distinct seasonal peak in SE and SW flying.



This peak is attributed to holiday flying in July and August and allows NATS to mitigate problems that may arise from the increase in movements.

Analysis of movements over the season identifies the busiest periods, allowing NATS to take steps in collaboration with the industry to mitigate against the issues caused by peaks in demand. The current data iteration shows a weekly peak of almost 52,000 movements for the UK and ROI. This is 1.0% lower than the peak week for Summer 2019, equivalent to 75 fewer flights per day in the peak week.

By analysing movements further by day of week, ACL can provide NATS with detailed information regarding the days and weeks of highest expected demand. Saturdays were identified as producing ATC issues in previous summer seasons, although for the upcoming season ACL data shows Saturday movements are currently 1.9% lower than seen last summer. This trend is not seen for London airports however, meaning the industry faces another challenge in dealing with weekend movements in an already busy airspace.

ACL are also able to provide reasons for growth and decline by examining destination countries where movements have changed significantly. Growth in the number of movements to and from Turkey is seen as an industry trend for the coming season and has been growing steadily in previous summer seasons. In contrast, several destination countries on the S and SW axes have seen significant decline for the upcoming summer.

Growth

Rank	Country	S19_Ops	S20_Ops	Change_Ops	%_Ops
11	Turkey	32,400	36,583	4,183	12.9%
12	Poland	32,285	34,614	2,329	7.2%
15	Norway	14,184	15,616	1,432	10.1%

Decline

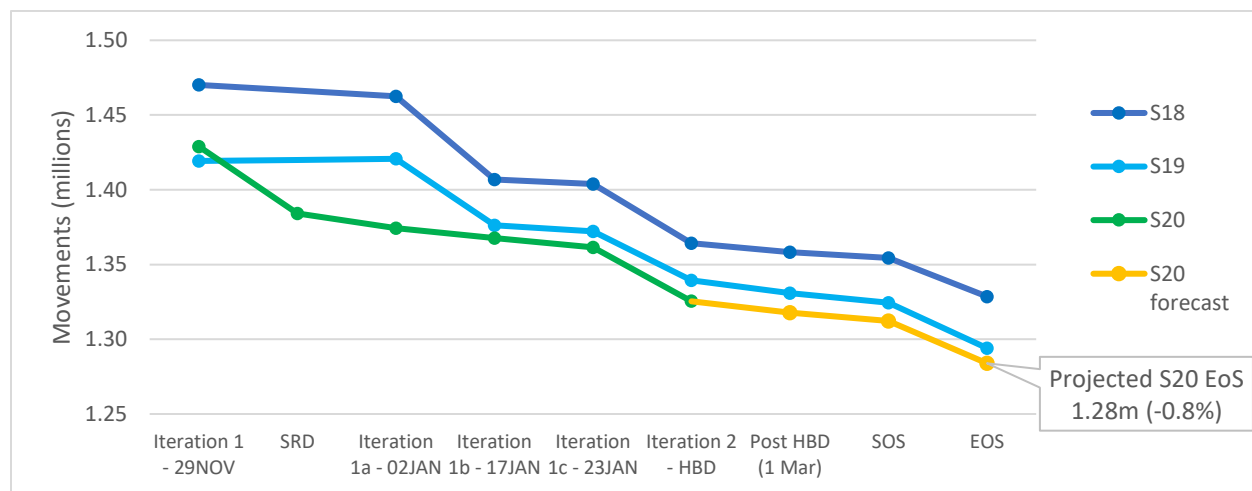
Rank	Country	S19_Ops	S20_Ops	Change_Ops	%_Ops
2	Spain	206,827	195,568	-11,259	-5.4%
3	Germany	93,559	87,176	-6,383	-6.8%
5	France	77,814	75,039	-2,775	-3.6%

A developing collaboration

Analysis of forecasting accuracy for Summer 2019 indicated that the quality of predictions improved as ACL provided later data iterations, showing the importance of the continued information provided up to the start of the season.

NATS were able to utilise a far more accurate data picture as a result of the final data iteration, highlighting the volatility of schedule changes ahead of the start of the season. Looking forward to Summer 2020, it was agreed that due to the increasing accuracy of later iterations, NATS and ACL would focus on high-level trends at the first iteration, building into a more detailed picture following slot return deadlines prior to the season starting. This demonstrates ACL's commitment to improving the process and continuing to provide useful and relevant information.

The volatile changes observed between data iterations for Summer 2020 underline the significance of ACL's ability to provide iterative updates using dynamic Power BI reporting, allowing NATS to have better visibility of schedule changes and to observe how trends are developing ahead of the start of the season.



Several further data iterations and trend updates will be provided to NATS and the IRG up to and including the start of the summer season, with the intention of enabling the industry to continue to improve its resilience against schedule changes and airspace congestion by utilising ACL's unique resources. ACL continue to identify the important trends, allowing NATS to ensure the industry is as well prepared as possible for the challenges of the upcoming season.

Looking ahead

As ACL and NATS continue to collaborate through the sponsorship of the IRG the level of detail and insight is increasing with each iteration. The ultimate aim is to have a level of dynamic updates which will give the industry time to plan ahead to minimise the impact of congestion, leading to better operational performance and an improved customer experience for all those using the airspace.